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IN THE

Supreme Court of the United States

OCTOBER TERM, 1996

ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC., EPSILON TECHNOLOGY, INC. d/b/a ASM EPITAXY,
Petitioners,

vs.

APPLIED MATERIALS, INC.,
Respondent.

ON PETITION FOR WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

PETITION FOR WRIT OF CERTIORARI

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QUESTION PRESENTED

After a patent expires, may the patent owner enforce a second patent solely to deprive the public of its well-established right to use the invention of the expired patent?

PARTIES TO THE PROCEEDINGS UNDER RULES 14.1(b) AND 29.6

Pursuant to Supreme Court Rule 14.1(b), Petitioners Advanced Semiconductor Materials America, Inc. and Epsilon Technology, Inc. d/b/a ASM Epitaxy certify that the names of all parties to this proceeding appear in the caption of this Petition for Writ of Certiorari.

Petitioners also certify that Advanced Semiconductor Materials International N.V. was a party to the proceedings in the District Court and is the parent company of Advanced Semiconductor Materials America, Inc. Petitioners further certify that ASM VT, Inc. and ASM Pacific Assembly Products, Inc. are the only non-party subsidiaries of Advanced Semiconductor Materials America, Inc.

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IN THE
SUPREME COURT OF THE UNITED STATES
OCTOBER TERM, 1996

ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC., EPSILON TECHNOLOGY, INC. d/b/a ASM EPITAXY,

Petitioners,

vs.

APPLIED MATERIALS, INC.,

Respondent.

PETITION FOR WRIT OF CERTIORARI

Petitioners Advanced Semiconductor Materials America, Inc. and Epsilon Technology, Inc. ("ASM") respectfully petition this Court for a writ of certiorari to the United States Court of Appeals for the Federal Circuit. ASM seeks review of the Federal Circuit's decision rejecting its defense of double patenting and upholding an injunction which bars ASM from any and all uses of the invention claimed in Respondent's expired patents.

REPORTED DECISIONS

The Federal Circuit's decision, together with the dissent of Chief Judge Archer, is reported at 98 F.3d 1563 and is reprinted in Appendix A. The Federal Circuit's order denying ASM's petition for rehearing and suggestion

for rehearing in banc, with Chief Judge Archer again dissenting, is reprinted in Appendix B.

The District Court's decision is reported at 32 U.S.P.Q.2d (BNA) 1865 and is reprinted in Appendix C. The injunction issued by the District Court is reprinted in Appendix D.

STATEMENT OF JURISDICTION

ASM seeks review of a decision of the Court of Appeals for the Federal Circuit issued October 24, 1996. App. A. On December 17, 1996, the Federal Circuit denied rehearing and declined to rehear this case in banc. App. B. Chief Judge Archer dissented from the decision on the merits and the denial of rehearing.

This Court has jurisdiction under 28 U.S.C. § 1254(1) to review the Court of Appeals' decision. The Court of Appeals had jurisdiction under 28 U.S.C. § 1292(c) to review the District Court's order entering a permanent injunction against ASM. The District Court had jurisdiction under 28 U.S.C. §§ 1331, 1338.

CONSTITUTIONAL PROVISIONS AND STATUTES INVOLVED

The following constitutional provisions and statutes are involved in this case:

United States Constitution, Art. I, Sec. 8, Cl. 8:

The Congress shall have Power . . .

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries; . . . .

35 U.S.C. § 121 (1994) (subdivision numbers added):

[1] If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions. **[2]** If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title it shall be entitled to the benefit of the filing date of the original application. **[3]** A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or

any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application. . . .

35 U.S.C. § 154 (1994):*

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, for the term of seventeen years, subject to the payment of fees as provided for in this title, of the right to exclude others from making, using, or selling the invention throughout the United States . . . .

STATEMENT OF THE CASE

This case involves one of the most basic principles of patent law — the public's right to use the inventions of expired patents. This Court has repeatedly and unequivocally recognized the public's unfettered right to use the inventions of expired patents. Nevertheless, the Federal Circuit, which has exclusive jurisdiction over all patent appeals from the District Courts and the Patent Office, has repeatedly rejected any such right. In this case, the Federal Circuit, over the dissent of Chief Judge Archer, again disregarded the public's right to use the invention of an expired patent. Eight years after expiration of a patent,

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* This statute has been recently amended in a manner which does not affect the patent at issue on this Petition, nor the 1.2 million other unexpired patents which issued before the effective date of the amendment.

the Federal Circuit majority upheld a second patent which prevents the public from making any use at all of the invention of the expired patent.

A. Applied's Patent Applications

In 1969, twenty-eight years ago, Respondent Applied Materials, Inc. ("Applied") filed its original application for the patent at issue here, U.S. Patent No. 4,496,609. The following year, the Patent Examiner reviewing the application concluded it claimed three inventions. Accordingly, the Examiner issued a notice known as a "restriction requirement." This notice required Applied to divide its patent application into three separate applications.

The first of these patent applications issued in 1971 as U.S. Patent. No. 3,623,712. This patent claimed as an invention a particular machine for processing semiconductor wafers from which computer chips are made. This patent entitled Applied to exclude all others from using that machine during the 17-year term of the patent, which expired in 1988. 35 U.S.C. § 154.

Applied then pursued its second patent application. This patent application claimed as an invention a minor variation of the machine covered by Applied's first patent. The Patent Office approved this application in 1977. Applied recognized that this patent, if given a full statutory 17-year term, would not expire until 1994, six years after the expiration of Applied's first patent. This would have

given Applied 23 years of patent protection for its invention, a violation of the clear statutory limit of a 17-year patent term.

Recognizing the impropriety of this 23-year monopoly, Applied filed a document in the Patent Office known as a "terminal disclaimer." In this document, Applied disclaimed the final six years of the statutory term of its second patent, declaring it would expire at the same time as its first patent, in 1988. *See* 35 U.S.C. § 253 ¶ 2; 37 C.F.R. § 1.321. For this reason, issuance of this second patent could not extend Applied's patent monopoly. *See generally In re Robeson*, 331 F.2d 610, 614 (CCPA 1964). After Applied filed its terminal disclaimer, Applied's second patent application issued as U.S. Patent No. 4,047,496 in 1977.

Applied then pursued its third patent application. This patent application did not issue as a patent until 1985, 14 years after Applied received its first patent. The resulting patent, U.S. Patent No. 4,496,609, is the patent at issue on this Petition.

Initially, the application for the 1985 patent claimed as an invention a narrow, specialized ***use*** of the same machines Applied had patented in 1971 and 1977. However, while the application was pending in the Patent Office, Applied amended it to cover ***all uses*** of those machines.

As a result of this amendment, the 1985 patent is completely duplicative of Applied's two earlier patents.

Applied's first two patents gave Applied the right to exclude all others from using its wafer processing machine. 35 U.S.C. § 154. This very same right was conferred again by the 1985 patent. *Id.*

Because of their identical scope, even Applied concedes the "invention" of its 1985 patent is not independent and distinct from the invention of its two earlier patents. Applied, however, chose not to file a terminal disclaimer in connection with the 1985 patent. Instead, it retained the full 17-year term of this patent. Thus, this patent will not expire until 2002, giving Applied a 31-year monopoly on all uses of its machine.

B. The District Court Proceedings

In this action, Applied has accused ASM of infringing, *inter alia*, the 1985 patent. ASM raised the defense of double patenting. This defense bars an inventor from obtaining two patents on the same or similar invention, thereby extending the patent monopoly beyond the 17-year statutory term. *See Miller v. Eagle Mfg. Co.*, 151 U.S. 186, 198 (1894).

Following a bench trial, the District Court rejected ASM's double-patenting defense. C23-27. The District Court held the patent laws, as interpreted by the Court of Appeals for the Federal Circuit, permitted Applied to extend its monopoly by securing multiple patents. In the District Court's view, the Patent Examiner's 1970 decision to issue a restriction requirement under 35 U.S.C. § 121 was dispositive of the double-patenting issue. C27. The

Examiner's decision, the court held, gave Applied's 1985 patent absolute immunity from the charge of double patenting, unless Applied amended its 1985 patent in a manner inconsistent with the Examiner's restriction requirement. C24.

C. The Federal Circuit Proceedings

On appeal, a sharply divided panel of the Court of Appeals for the Federal Circuit affirmed the District Court's decision. The panel of three Circuit Judges issued four separate opinions. The two principal opinions on the issue of double patenting were the majority opinion of Circuit Judge Newman and the dissenting opinion of Chief Judge Archer. The remaining opinions related primarily to patents not at issue on this Petition.

Judge Newman's majority opinion agreed with the District Court that Federal Circuit precedent permitted Applied to obtain 31 years of patent protection. A5-10. The majority concluded that, after a Patent Examiner issues a restriction requirement, "§ 121 insulates the ensuing patents from the charge of double patenting." A9. Thus, Applied was permitted to obtain a patent in 1971 for an apparatus, and a patent in 1985 for all uses of that same apparatus. To the majority, it was immaterial that the apparatus of the expired patent could do nothing except perform the process of the 1985 patent.

The Federal Circuit also rejected as irrelevant the undisputed fact that the claimed inventions of the 1985 and 1971 patents were not "independent and distinct" as

expressly required by Section 121. A10. To the majority, the issuance of a restriction requirement on the original patent application was conclusive. A9-10. The majority opinion did not address ASM's argument that the public gained nothing upon the expiration of Applied's first patent.

Chief Judge Archer dissented. *See* A30-37. As Chief Judge Archer explained, Section 121 and the Patent Office's own rules permit the issuance of two patents only if the patent applicant has two "separate and distinct inventions." A33-34. Moreover, as Chief Judge Archer emphasized, Applied conceded that its patented process was merely the use of its patented apparatus, and therefore not a separate and distinct invention. A35 & n.3. As a result, Chief Judge Archer explained, Applied obtained a 31-year monopoly which will not expire until 2002. A35, A37.

On December 17, 1996, the Federal Circuit denied ASM's petition for rehearing and suggestion for rehearing in banc, with Chief Judge Archer again dissenting. B1-2. ASM then timely filed this petition.

SUMMARY OF ARGUMENT

For more than a century, this Court has consistently held that the public is free to use the invention of an expired patent without restriction. This fundamental right is the very consideration which the public receives in

exchange for the grant of the temporary monopoly of each patent.

In a series of cases, however, the Federal Circuit and its predecessor court, the United States Court of Customs and Patent Appeals, have departed from this Court's long line of precedents. These courts have taken the view that the expiration of a patent is a non-event, that it carries with it nothing but the right not to be sued on the expired patent. Thus, under Federal Circuit precedent, the owner of an expired patent is free to take out additional patents which destroy the public's right to use the invention of the expired patent.

This case presents the absurd extreme of the Federal Circuit's view. In 1971, Applied obtained its first patent for a machine for processing semiconductor wafers. That patent granted Applied the right to exclude all others from using its patented machine until this patent's expiration in 1988. Thus, beginning in 1988, the public should have been free to use Applied's patented machine.

Applied, however, obtained another patent in 1985, just three years before the expiration of the first patent. This patent claims as a new "invention" every possible use of the very machine which Applied patented in 1971. Thus, Applied's 1985 patent completely destroys the public's right to use the invention of Applied's expired patent, barring every single use of that invention. Because of this duplicative patent, the public gained ***nothing*** upon the expiration of Applied's first patent. Furthermore, because Applied's duplicative patent will not expire until

2002, Applied has obtained a 31-year monopoly on the use of its machine, not the 17-year monopoly authorized by statute.

Presented with these extreme facts, the Federal Circuit fully endorsed this 31-year monopoly. The Federal Circuit followed and extended its own precedents and concluded that nothing need enter the public domain upon the expiration of Applied's first patent. This Court's precedents, of course, are directly to the contrary, consistently recognizing the public's unfettered right to use the inventions of expired patents.

This Court has already once instructed the Federal Circuit not to depart from this Court's long line of precedents regarding patent expiration. Nevertheless, the Federal Circuit has adhered to its own course, and departed even more dramatically from this Court's precedents in this case. Moreover, because the Federal Circuit has exclusive jurisdiction over patent appeals, the Federal Circuit's ruling has national importance and will not be the subject of further discussion in the lower courts. This Court should grant this Petition and restore to the public its right to practice the inventions of expired patents.

REASONS FOR GRANTING THE WRIT

I.

THE FEDERAL CIRCUIT HAS DRAMATICALLY DEPARTED FROM THIS COURT'S PRECEDENTS, DEPRIVING THE PUBLIC OF ITS RIGHTFUL BENEFITS FROM THE PATENT SYSTEM

A. For More Than A Century, This Court Has Recognized And Exalted The Public's Right To Use The Inventions Of Expired Patents

This Court's precedents make abundantly clear that the expiration of a patent is a significant public event. Upon expiration of a patent, the patented invention passes into the public domain, and the public may use that invention "free from all restrictions." *Scott Paper Co. v. Marcalus Mfg. Co.*, 326 U.S. 249, 257 (1945); *accord Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 165 (1989); *Brulotte v. Thys Co.*, 379 U.S. 29, 31-33 (1964); *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 230 (1964); *Kellogg Co. v. National Biscuit Co.*, 305 U.S. 111, 120 (1938); *Singer Mfg. Co. v. June Mfg. Co.*, 163 U.S. 169, 185 (1896). "[T]he patent laws preclude the patentee and all others . . . from recapturing any part of the former patent monopoly." *Scott Paper*, 326 U.S. at 256.

As this Court explained over a century ago:

> It is self-evident that on the expiration of a patent the monopoly created by it ceases to exist, and the right to make the thing formerly covered by the patent becomes public property. It is upon this condition that the patent is granted. It follows, as a matter of course, that on the termination of the patent there passes to the public the right to make the machine in the form in which it was constructed during the patent.

Singer, 163 U.S. at 185 (quoted in *Kellogg*, 305 U.S. at 120, and *Bonito Boats*, 489 U.S. at 152). In short, when a patent expires the "monopoly is exhausted," *Miller v. Eagle Mfg. Co.*, 151 U.S. 186, 198 (1894), and the public acquires "a federal right to 'copy and to use'" the invention of the expired patent. *Bonito Boats*, 489 U.S. at 165.

This public right is fundamental to the bargain between the public and the inventor which underlies the grant of each patent. Indeed, it is the very consideration for which a patent is given. *Bonito Boats*, 489 U.S. at 151 (quoting *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 186-87 (1933)); *Scott Paper*, 326 U.S. at 255. The public suffers a 17-year monopoly in exchange for the inventor's disclosure of the invention and the right to practice that invention upon expiration of the 17-year term. This is the "*quid pro quo*" of the patent grant. *Universal Oil Products Co. v. Globe Oil & Refining Co.*, 322 U.S. 471, 484 (1944).

To protect this important public interest, this Court has rejected all efforts to extend the life of a patent monopoly beyond its limited statutory term, "whatever the legal device employed." *Scott Paper*, 326 U.S. at 256. For example, this Court has rejected state laws which extend the monopoly of an expired patent, or grant a monopoly on an unpatented device. *Bonito Boats*, 489 U.S. at 157-64. Similarly, this Court has rejected patent owners' reliance upon state contract law and state law principles of equity to extend patent monopolies. *Brulotte*, 379 U.S. at 31-34; *Scott Paper*, 326 U.S. at 257.

Finally, and most relevant here, this Court has rejected the obvious scheme of extending a monopoly by taking out a second patent covering the same invention as an expired patent. *Miller*, 151 U.S. at 198. This last form of unlawful monopoly extension has come to be known as "double patenting." *See Caliga v. Inter Ocean Newspaper Co.*, 215 U.S. 182, 189 (1909); *In re Goodman*, 11 F.3d 1046, 1052 (Fed. Cir. 1993); *see generally* EMERSON STRINGHAM, DOUBLE PATENTING (1933).

B. For More Than Three Decades, The Federal Circuit And Its Predecessor Court Have Refused To Recognize The Public's Right To Use The Inventions Of Expired Patents

The decisions of the Federal Circuit and its predecessor, the Court of Custom and Patent Appeals (CCPA), are shockingly antithetical to this Court's binding precedents. This divergence from precedent began in *In re Mogen David Wine Corp.*, 328 F.2d 925 (CCPA 1964).

Just three days before the CCPA's *Mogen David* decision, this Court held:

> ***[W]hen the patent expires*** the monopoly created by it expires too, and ***the right to make the article*** — including the right to make it in precisely the shape it carried when patented — ***passes to the public.***

Sears, 376 U.S. at 230 (emphasis added). Nevertheless, in *Mogen David*, the CCPA observed:

> We know of no provision of patent law, statutory or otherwise, that guarantees to anyone an absolute right to copy the subject matter of an expired patent. Patent expiration is nothing more than the cessation of the patentee's right to exclude held under the patent law.

Mogen David, 328 F.2d at 930. The *Mogen David* court made no effort to reconcile this statement with this Court's holding in *Sears*. Indeed, the *Mogen David* court did not even mention *Sears* or this Court's earlier decisions in *Scott Paper*, 326 U.S. at 255-58, *Kellogg*, 305 U.S. at 120, or *Singer*, 163 U.S. at 185.

The CCPA's divergence from this Court's precedents continued the following year in *In re Heinle*, 342 F.2d 1001 (CCPA 1965). In *Heinle*, the Patent Office had rejected a patent application on the ground of double patenting. *Id.* at 1003. The Patent Office had concluded that the same invention was disclosed in the patent

applicant's earlier patent, and the public must be permitted to use the invention of the earlier patent upon its expiration. *Id.* at 1005. The CCPA reversed the Patent Office, holding:

> The expiration of a patent is not a guarantee of a right to use.

Id. Again, the CCPA made no effort to reconcile its holding with this Court's decisions in *Sears*, *Scott Paper*, *Kellogg*, or *Singer*.

The CCPA reached the identical conclusion in *Mine Safety Appliances Co. v. Electric Storage Battery Co.*, 405 F.2d 901, 902 n.2 (CCPA 1969), unequivocally rejecting the argument "that the patent laws put things into the public domain when patents expire." The CCPA characterized this argument as "all too prevalent" and observed:

> Patent laws function only to keep things out of the public domain temporarily. They have nothing to do with putting things into it. They say nothing about the right to copy or right to use, they speak only in terms of right to exclude.

Id. This time, the CCPA finally addressed this Court's holding in *Sears*, dismissing it as "dicta." *Id.* Once again, the CCPA did not address *Scott Paper*, *Kellogg*, or *Singer*.

The CCPA finally addressed *Scott Paper*, *Kellogg*, and *Singer* in *In re Honeywell, Inc.*, 497 F.2d 1344 (CCPA 1974). The *Honeywell* court concluded that this Court's

holdings, which guarantee the public's right to use the invention of an expired patent, were "substantially" correct. *Id.* at 1347. The CCPA, however, narrowly construed the public's right, holding it is inapplicable to ornamental features shown in expired design patents. *Id.* at 1349. *But see Coats v. Merrick Thread Co.*, 149 U.S. 562, 571-72 (1893) (reaching the opposite conclusion).

The Federal Circuit adopted the CCPA's decisions as precedent, *South Corp. v. United States*, 690 F.2d 1368 (Fed. Cir. 1982) (in banc), and has dutifully followed the CCPA's wayward path. For example, in *Interpart Corp. v. Italia*, 777 F.2d 678 (Fed. Cir. 1985), the Federal Circuit held that the patent laws say "nothing about the right to copy or the right to use." *Id.* at 685 (quoting *Mine Safety*, 405 F.2d at 902 n.2). Similarly, in *Studiengesellschaft Kohle mbH v. Northern Petrochemical Co.*, 784 F.2d 351 (Fed. Cir. 1986), *cert. dismissed*, 478 U.S. 1028 (1986), the Federal Circuit rejected a defense of double patenting, holding:

> The expiration of a patent right is not a guarantee of a right to use.

Id. at 357 (quoting *Heinle*, 342 F.2d at 1005). Once again, in *Interpart* and *Studiengesellschaft*, the Federal Circuit did not mention any of this Court's contrary decisions.

This Court squarely rejected the Federal Circuit's approach in *Bonito Boats*, 489 U.S. 141. There, this Court was "troubled by the *Interpart* court's reference to the *Mine Safety* case for the proposition that the patent laws

say 'nothing about the right to copy or the right to use.'" *Id.* at 164. That view of the patent laws, this Court held, was inconsistent with a century of controlling precedent. As this Court explained:

> For almost 100 years it has been well established that in the case of an expired patent, the federal patent laws *do* create a federal right to "copy and to use." *Sears* and *Compco* [*v. Day-Brite Lighting, Inc.*, 376 U.S. 234 (1964)] extended that idea to potentially patentable ideas which are fully exposed to the public. The *Interpart* court's assertion to the contrary is puzzling and flies in the face of the same court's decisions applying the teaching of *Sears* and *Compco* in other contexts.

Id. at 165 (emphasis in original).

Despite this Court's express disapproval, the Federal Circuit has continued on its own course. With just one isolated exception, *see Elmer v. ICC Fabricating*, 67 F.3d 1571, 1580 (Fed. Cir. 1995), the Federal Circuit has denied the existence of any public right to use the inventions of expired patents. For example, twice since *Bonito Boats*, in rejecting charges of double patenting, the Federal Circuit concluded:

> [A]s a matter of law the extension of protection objection is not necessarily controlling.

General Foods Corp. v. Studiengesellschaft Kohle mbH, 972 F.2d 1272, 1278 (Fed. Cir. 1992); *In re Braat*, 937 F.2d 589, 594 (Fed. Cir. 1991). In each of these cases, the Federal Circuit relied upon pre-*Bonito Boats* decisions of the CCPA for support.

Similarly, in the present case, the Federal Circuit once again disregarded the public's right to use the invention of an expired patent. Indeed, by approving a second patent covering every possible use of the invention of Applied's expired patent, the Federal Circuit approved the greatest possible encroachment upon the public's right. The Federal Circuit allowed the public to gain ***nothing*** upon the expiration of the earlier patent.

Once again, as in *Interpart*, the Federal Circuit has stood by its view that the expiration of a patent is a meaningless event, which carries with it only the right not to be sued under that particular patent. Like *Interpart*, the Federal Circuit's decision in this case is fundamentally at odds with 100 years of this Court's precedents. Moreover, the Federal Circuit's decision potentially extends the monopoly of every existing patent which resulted from a restriction requirement. This Court should grant certiorari and explicitly instruct the Federal Circuit that the expiration of a patent is a significant event which gives to the public the right to use the invention of that patent.

II.

NOTHING IN 35 U.S.C. § 121 JUSTIFIES THE EXTENSION OF MONOPOLIES ENDORSED BY THE FEDERAL CIRCUIT

In recent decisions, the Federal Circuit has bypassed this Court's patent-expiration precedents by relying upon 35 U.S.C. § 121 to immunize certain patents from any double-patenting challenge. *See* A5-10; *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1179 (Fed. Cir. 1993); *Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1579 (Fed. Cir. 1991). According to the Federal Circuit, when a Patent Examiner issues a restriction requirement, Section 121 "insulates the ensuing patents from the charge of double patenting." A9; *see also Studiengesellschaft*, 784 F.2d at 358-61 (Newman, J., concurring). The Federal Circuit's end run around this Court's precedents is contrary to the most basic principles of statutory construction announced by this Court.

"The normal rule of statutory construction is that if Congress intends for legislation to change the interpretation of a judicially created concept, it makes that intent specific." *Midlantic National Bank v. New Jersey Dept. of Environmental Protection*, 474 U.S. 494, 501 (1986); *accord Green v. Bock Laundry Machine Co.*, 490 U.S. 504, 521 (1989). This is especially true when a party claims that a statute has overturned precedent to expand patent rights at the expense of the public. As this Court has twice explained:

> [W]e should not expand patent rights by overruling or modifying our prior cases construing the patent statutes, unless the argument for expansion of privilege is based on more than mere inference from ambiguous statutory language. We would require a clear and certain signal from Congress before approving the position of a litigant who . . . argues that the beachhead of privilege is wider, and the area of public use narrower, than courts had previously thought.

Parker v. Flook, 437 U.S. 584, 596 (1978) (quoting *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1972)). Thus, unless Section 121 evidences a clear congressional intent to overturn this Court's patent-expiration decisions, and expand private rights at public expense, the Federal Circuit has improperly disregarded those precedents.

Section 121 demonstrates no such congressional intent. Section 121 was part of the Patent Act of 1952. It codified the Patent Office's discretion to restrict a patent application to one invention "[i]f two or more independent and distinct inventions are claimed" in the application. 35 U.S.C. § 121. After such a restriction requirement is issued, Section 121 permits the applicant to file a "divisional application" to claim the "other invention." *Id.*

The third sentence of Section 121 further describes these divisional applications. The Federal Circuit relies upon this sentence alone to create an exception to the

public's right to use the inventions of expired patents. The third sentence of Section 121 provides in full:

> A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application.

35 U.S.C. § 121.

This provision merely authorizes the Patent Office to issue a separate patent for each application it has required the patent applicant to file. *See* S. Rep. No. 1979, 82d Cong., 2d Sess. 20 (1952). This innocuous authorization does not even address patent expiration and thus can have no bearing on this Court's many decisions upholding the public's right to use the invention of an expired patent.

Section 121 leaves completely intact the procedures by which the Patent Office and the courts secure the public's right to use the inventions of expired patents. When issuance of a second patent to the same inventor may compromise the public's right, the Patent Office ordinarily requires the patent applicant to file a terminal disclaimer. *See* 37 C.F.R. § 1.78(d); *In re Vogel*, 422 F.2d 438, 442

(C.C.P.A. 1970). The terminal disclaimer causes the applicant's second patent to expire the same day as the first, thus securing the public's right to use the invention of the first patent upon its expiration. *Robeson*, 331 F.2d at 614. This is the very procedure Applied followed with its 1977 patent.

When an applicant fails to file a terminal disclaimer, as Applied failed to do with its 1985 patent, the public's right is compromised. In these cases, the courts have traditionally protected the public interest by holding the public is free to use the invention of the expired patent and declaring the second patent invalid for double patenting. *See, e.g., Scott Paper*, 326 U.S. at 255-58; *Goodman*, 11 F.3d at 1052; *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108-09 (Fed. Cir. 1987); *see also* EMERSON STRINGHAM, DOUBLE PATENTING (1933). Section 121 does not even relate to this fundamental tenet of patent law.

Moreover, both principal drafters of the 1952 Patent Act concluded Section 121 does not address double patenting and does not restrict the public's right to use the inventions of expired patents. One such drafter, Giles S. Rich, now a Judge of the Federal Circuit, confirmed in 1952 that Section 121 does not address double patenting:

> There may be a question about the applicability of this section to the double-patenting issue. I believe one patent or application may be cited against the other for this purpose.

Gerber Garment Tech., Inc. v. Lectra Systems, Inc., 916 F.2d 683, 687 n.2 (Fed. Cir. 1990).

Similarly, the other principal drafter, Patent Examiner-in-Chief P.J. Federico, concluded that Section 121 did not overrule or restrict this Court's precedents relating to patent expiration. Federico observed that existing Supreme Court case law was sufficient to ensure that the public retained its right to practice the invention of an expired patent. John C. McIntyre, Jr., *The Effect of a Restriction Requirement in the Patent and Trademark Office on a Subsequent Double Patenting Adjudication*, 4 Amer. Pat. L. Assn. Q. J. 301, 303-04 n.12 (1976) (quoting P.J. Federico). As Federico correctly explained, "the principle which was enunciated by the Supreme Court in *Scott Paper Company, Inc.*, 326 U.S. 249 (1945), could apply" to prevent improper extensions of monopolies. *Id.*

In addition, the legislative history casts grave doubt upon the Federal Circuit's apparent belief that Congress intended in 1952 to emasculate the fundamental patent-exhaustion doctrine that this Court reaffirmed just seven years earlier in *Scott Paper*. The House and Senate Reports both stated that Section 121 merely codified existing practice, with "some ***minor changes*** in the concepts involved." S. Rep. No. 1979, 82d Cong., 2d Sess. (1952) (emphasis added); H.R. Rep. No. 1923, 82d Cong., 2d Sess. (1952). Undermining a whole series of this Court's precedents, without comment, would hardly be a "minor change." Even the Federal Circuit's predecessor court questioned whether Section 121 concerns double patenting at all. *In re Ziegler*, 443 F.2d 1211, 1214-15

(CCPA 1971). Section 121 thus falls far short of demonstrating the clear intent necessary to overturn fundamental principles of patent law, long recognized by this Court.

Worse still, the Federal Circuit has disregarded Section 121's express requirement that two patents may issue only if they claim "separate and distinct inventions." 35 U.S.C. § 121. This provision preserves the double-patenting doctrine by prohibiting the issuance of two or more patents for the same or similar inventions. Nevertheless, the Federal Circuit concluded that a restriction requirement under Section 121 "insulates the ensuing patents from the charge of double patenting," even when those patents do not claim separate and distinct inventions. A9.

Here, for example, Applied amended its application for the 1985 patent after the Patent Office issued its restriction requirement. As a result of this amendment, the claims of the 1985 patent were indistinct from the claims of the 1971 patent, in violation of the express terms of Section 121. Even Applied conceded that the 1985 and 1971 patents did not claim separate and distinct inventions. A34 & n.3. The Federal Circuit, however, concluded this concession was irrelevant because the Patent Office had issued a restriction requirement. A9-10. Because the Federal Circuit's misconstruction of the statute so drastically restricts a fundamental public right which has been strongly and repeatedly endorsed by this Court's precedents, this Court should grant certiorari.

III.

THE FEDERAL CIRCUIT HAS RELIED UPON A MISGUIDED POLICY JUSTIFICATION TO APPROVE PATENT TERM EXTENSIONS

Because the express terms of Section 121 do not address double patenting or patent expiration, the Federal Circuit appealed to public policy to support its decision. The Federal Circuit's public-policy discussion, however, did not even acknowledge the public interest. Instead, the Federal Circuit focused exclusively on the interests of patent applicants, seeking to "protect the patentee" and "safeguard patent validity," regardless of the public cost. *See* A9-10.

The Federal Circuit's skewed patent-policy analysis is again contrary to this Court's settled precedents. As this Court has often explained, the primary purpose of the patent laws is to benefit the public, not individual inventors. *See, e.g., Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917). The public interest is served primarily by giving the public access to inventions "after the limited period of exclusive control has expired." *Sony Corp. of America v. Universal City Studios, Inc.*, 464 U.S. 417, 429 (1984).

Indeed, the Constitution itself states that the purpose of the patent laws is "to promote the progress of the useful arts and sciences," not to protect the interests of inventors. U.S. Const. art. I, § 8, cl. 8. *See also Kendall v. Winsor*, 62 U.S. (21 How.) 322, 327-28 (1859); *Pennock v.*

Dialogue, 27 U.S. (2 Pet.) 1, 7 (1829). Similarly, the Patent Act declares that all patents shall expire in 17 years, 35 U.S.C. § 154, providing the public with a date certain on which it shall receive its benefit from the grant of each patent.

The interests of inventors, on which the Federal Circuit relies so heavily, are only secondary. *Motion Picture Patents*, 243 U.S. at 511. Moreover, the interests of inventors alone cannot justify the expansion of their monopolies. "The far-reaching social and economic consequences of a patent . . . give the public a paramount interest in seeing that patent monopolies . . . are kept within their legitimate scope." *Blonder-Tongue Labs., Inc. v. University of Ill. Found.*, 402 U.S. 313, 343 (1971) (quoting *Precision Instrument Mfg. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, 816 (1945)).

The Federal Circuit's improper elevation of private interests over the public interest causes great harm to the public. The Federal Circuit now endorses monopolies of 31 years or more, without any consideration of the public interest or the statutory 17-year term. An incalculable number of the 1¼ million existing patents could benefit from the Federal Circuit's misguided zeal to protect patent applicants. For each of these patents, the public will be deprived of its primary benefit under the patent system, the right to use the patented invention when the patent expires.

CONCLUSION

The Federal Circuit's decision is of national importance. It is in direct contravention to many precedents of this Court which are fundamental to the proper functioning of our Nation's patent system. By ignoring the precedents of this Court which guarantee the public's interest in expired patents, the Federal Circuit has denied the public the primary benefit of the patent system. Accordingly, this Court should grant a writ of certiorari to the Court of Appeals for the Federal Circuit.

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DATED: March 13, 1997

APPENDIX A

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Appeal Nos. 94-1428, 94-1466

APPLIED MATERIALS, INC.,
Plaintiff/Cross-Appellant,
v.
ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC. and EPSILON TECHNOLOGY, INC., d/b/a ASM EPITAXY,
Defendants-Appellants.

ON APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA IN C-91-20061 ENTERED JULY 15, 1994 AND AUGUST 11, 1994 BY JUDGE WILLIAM A. INGRAM

October 24, 1996, Decided

DISPOSITION: AFFIRMED IN PART, REVERSED IN PART, AND REMANDED; MOTION DISMISSED

JUDGES: Before ARCHER, Chief Judge, NEWMAN and MAYER, Circuit Judges. Opinion for the court filed by Circuit Judge NEWMAN for Parts I and II; dissenting opinion as to Part I filed by Chief Judge ARCHER. For Part III, Chief Judge ARCHER and Circuit Judge MAYER each filed opinions concurring in the judgment of affirmance; dissenting opinion as to Part III filed by Circuit Judge NEWMAN.

OPINION: NEWMAN, Circuit Judge.

Advanced Semiconductor Materials America, Inc. and Epsilon Technology, Inc., together doing business as ASM Epitaxy (herein "ASM"), appeal those portions of the decision of the United States District Court for the Northern District of California[1] sustaining the validity of United States Patent No. 4,496,609 (the '609 or McNeilly patent), and holding that United States Patent No. 4,728,389 (the '389 or Logar patent) is infringed by application of the doctrine of equivalents. Applied Materials, Inc., owner of the '609 and '389 patents, appeals the district court's holding that its United States Patent No. 4,081,313 (the '313 patent) is invalid and that the '389 patent is not literally infringed. The validity of the '389 patent was not contested. The ruling that the '609 patent is infringed in not appealed.

We affirm the decisions that the '609 patent is valid and that the '389 patent is not literally infringed, reverse the decision that the '389 patent is infringed under the doctrine of equivalents, and affirm the decision that the '313 patent is invalid. The case is remanded for appropriate further proceedings.

DISCUSSION

Both Applied Materials and ASM are manufacturers and sellers of devices used in the production of semiconductor integrated circuits by chemical vapor deposition (CVD). By the process of CVD thin layers of

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[1] *Applied Materials, Inc. v. Advanced Semiconductor Materials America, Inc.*, 1994 U.S. Dist. LEXIS 7810, 32 U.S.P.Q.2D (BNA) 1865 (N.D. Cal. 1994).

chemical materials such as silicon and silicon compounds are deposited upon a substrate by exposing the substrate at high temperatures to the vaporized material to be deposited, under controlled conditions in oven-like reactor chambers. Due to the extremely small size and complex detail of the circuits produced and the thinness of the layers deposited, the control of contaminants during CVD is of paramount importance. The inventions of the patents in suit are directed to improvements in the methods and apparatus of CVD for the purposes of reducing or eliminating contaminants and enhancing the quality of the deposition product.

I
THE '609 (McNEILLY) PATENT

The purity of the deposition is affected by contaminants emanating from or passing through the quartz walls of the deposition chamber, and by the migration of contaminants onto the substrate by gravity or static electricity. A known method of reducing the contamination that arises from the quartz walls is to keep the walls cool during the deposition. Since the CVD substrate is heated to very high temperatures during the deposition, generally over 1100 degrees C, the heating of the substrate must be accomplished without heating the walls of the reaction chamber. The invention of the '609 patent is directed to an improved process for heating the substrate in a quartz reaction chamber, using radiant heat energy.

The prior CVD process of choice used radio frequency energy as the source of deposition heat. Since the quartz chamber walls transmit but do not absorb radio

frequencies, the walls remain cool and contamination is reduced. The substrate does not absorb radio frequency energy, and is heated indirectly by placing it on a slab of graphite called a susceptor; the susceptor absorbs the radio frequency, converts it to heat, and heats the substrate by contact.

The invention of the '609 patent is the use of high intensity heat lamps and radiant energy to heat the substrate, instead of using radio frequency energy. The prior art recognized this general use of radiant energy, but stated that it was not effective at high deposition temperatures. McNeilly and co-workers discovered not only that radiant energy can be used at high temperatures, but that it resulted in unexpected advantages in that it produced more uniform heating of the substrate and superior circuitry. The district court observed that after initial skepticism the Applied Materials method, subject of the '609 patent, was recognized as superior by the industry, and that Applied Materials' reactor has displaced the radio frequency reactor as the CVD apparatus of choice.

Applied Materials charged ASM with infringement of the '609 patent by ASM's Epsilon One reactor. The district court rejected ASM's defenses of patent invalidity and unenforceability, and found that the '609 patent was infringed. ASM appeals the validity determination on two grounds: double patenting and obviousness. Other issues concerning the '609 patent are not appealed.

Double Patenting

ASM argues that the '609 patent is invalid for double patenting with United States Patents No. 3,623,712 (the '712 patent) and No. 4,047,496 (the '496 patent). These three patents all arose from the same parent application. The '712 and '496 patents claim the apparatus and the '609 patent claims the process for this use of radiant energy. Claim 1, the broadest claim of the '609 patent, is shown in the margin[2].

The question of whether the claims of the process patent are subject to double patenting with the claims of the apparatus patents arises only if these patents are not entitled to the benefit of 35 U.S.C. § 121. ASM argues that Applied Materials lost this entitlement because during prosecution before the Patent and Trademark Office (PTO)

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[2] 1. In a process for effecting chemical vapor deposition coating of a substrate in a reaction chamber, the steps of:

placing the substrate in the reaction chamber on a susceptor of substantially greater size than the substrate and adapted to absorb and conduct radiant heat energy,

transmitting radiant heat energy through a wall of the reaction chamber to the susceptor to heat the susceptor by absorption of the radiant heat energy without appreciable absorption of said energy by the chamber wall,

maintaining the substrate in contact with the susceptor to permit a transfer of heat between the susceptor and the substrate whereby the substrate is heated and maintained at a substantially uniform temperature throughout,

and introducing a gaseous reactant into the reaction chamber for contact with the heated substrate to form a film by chemical vapor deposition thereon.

the applicant enlarged the process claims beyond their scope at the time of imposition of a "restriction requirement." ASM states that this action removed all of the '609 claims from the benefit of § 121, and requires that the '609 patent be either invalidated for double patenting or subjected to a terminal disclaimer. These issues relating to § 121 are matters of statutory interpretation, to which we give plenary review on appeal.

The patent examiner imposed a restriction requirement on the McNeilly patent application as it was originally filed, in accordance with the first sentence of 35 U.S.C. § 121:

> § 121 [1] If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions.

As required by administrative rule, in imposing the restriction requirement the examiner divided the claims into groups, viz. "an oven-type radiation heated reactor," "a reactor with means for introducing gaseous reactants," and "a gaseous epitaxial coating process." In response to the examiner's requirement that the applicant elect which invention he wished to continue prosecuting in the original application, McNeilly elected the radiation-heated reactor and duly prosecuted the other two inventions in separately filed divisional applications. The second sentence of § 121 recognizes this procedure and provides that such divisional applications are entitled to the benefit of the original filing date:

> § 121[2] If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title it shall be entitled to the benefit of the filing date of the original application.

The three patent applications issued as the '712 and '496 patents on the apparatus and the '609 patent on the process. We take note that the history of these patents shows several refilings, amendments, and continuations-in-part, as discussed in *Applied Materials, Inc. v. Gemini Research Corp.*, 835 F.2d 279, 15 U.S.P.Q.2d (BNA) 1816 (Fed. Cir. 1988).

The process claims as presented in the original application and carried into the '609 divisional application were drawn to the deposition of epitaxial layers[3]. During further prosecution the claims were amended to include chemical vapor deposition broadly, thus encompassing non-epitaxial deposition as well as epitaxial, as generally described in the specification. The district court observed that the PTO classification, a criterion of restriction requirements, was unchanged. ASM argues that this change in scope of the claims after the restriction requirement was initially imposed eliminates the benefit of the third sentence of § 121:

> § 121[3] A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed

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[3] An epitaxial layer is one that has the same crystallographic structure as the substrate upon which it is deposited.

> as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application.

ASM states that without the shield of § 121 the '609 process patent is invalid for double patenting with the '712 and the '496 apparatus patents. ASM states that this shield is lost if there is any change in the scope of the claims, whether or not the PTO classification is unchanged.

The purpose of the rule against double patenting is to prevent an inventor from effectively extending the term of exclusivity by the subsequent patenting of variations that are not patentably distinct from the first-patented invention. *See In re Vogel*, 57 C.C.P.A. 920, 422 F.2d 438, 164 U.S.P.Q. 619 (1970) (discussing the judge-made law of double patenting). Thus a patentee can not obtain a later patent for the same invention that has already been patented. Nor can a patentee obtain a later patent for an obvious variant of the invention claimed in the earlier patent, unless the patentee disclaims the term of the later patent beyond the expiration of the earlier one. *See Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 873, 20 U.S.P.Q.2d 1392, 1394 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 892, 225 U.S.P.Q. 645, 648 (Fed. Cir. 1985).

However, when the existence of multiple patents is due to the administrative requirements imposed by the Patent and Trademark Office, 35 U.S.C. § 121 provides

that the inventor shall not be prejudiced by having complied with those requirements. Thus when two or more patents result from a PTO restriction requirement, whereby aspects of the original application must be divided into separate applications, § 121 insulates the ensuing patents from the charge of double patenting. *See Studiengesellschaft Kohle mbH v. Northern Petrochemical Co.*, 784 F.2d 351, 354, 228 U.S.P.Q. 837, 840 (Fed. Cir.), *cert. dismissed*, 478 U.S. 1028, 106 S. Ct. 3343, 92 L. Ed. 2d 763 (1986).

The district court held that the amendments to the process claims during subsequent prosecution of the divisional '609 application did not eliminate the benefit of § 121 from the ensuing patent. A restriction requirement does not prohibit subsequent amendments to the claims. As discussed in *Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n*, 988 F.2d 1165, 1179, 26 U.S.P.Q.2d 1018, 1029 (Fed. Cir. 1993), the examiner's demarcation among the separate inventions should be preserved. However, even if such consonance is lost, double patenting does not follow if the requirements of § 121 are met or if the claims are in fact patentably distinct. *See id.* at 1179, 26 U.S.P.Q.2d at 1029-30. In this case consonance was not violated, for the process claims remained in separate patents from the apparatus claims although the scope of the process claims was modified.

ASM argues that the restriction requirement might not have been imposed at all if the non-epitaxial process claims had been present initially. However, the benefit of § 121 is not lost simply because it might not have been imposed. The purpose of § 121 is to accommodate administrative convenience and to protect the patentee from

technical flaws based on this unappealable examination practice. Thus the fourth sentence of § 121 provides that failure to impose a restriction requirement is not grounds of patent invalidity:

> § 121[4] The validity of a patent shall not be questioned for failure of the Commissioner to require the application to be restricted to one invention.

Section 121, viewed overall, assures that the technicalities of restriction practice are not elevated from their purpose of examination convenience to a potential taint on the validity of the ensuing patents. It was explained in the House and Senate Reports accompanying the 1952 Patent Act that § 121 means that

> neither of the resulting patents can be held invalid over the other merely because of their being divided in several patents.

S. REP. NO. 1979, 82d Cong., 2d Sess. 20, *reprinted in* 1952 U.S.C.C.A.N. 2394, 2413; H. R. REP. NO. 1923, 82d Cong., 2d Sess. 20 (1952). Thus it is not material whether the imposition of the restriction requirement might have been avoided had different claims been presented initially, for the purpose of § 121 is simply to safeguard patent validity from the vagaries of the restriction practice, not to change the practice.

The examiner raised no objection to the inclusion of non-epitaxial claims in the '609 process application after restriction. We affirm the district court's ruling that the '609 patent is not invalid for double patenting.

Obviousness

ASM states that the prior art renders the '609 patent invalid for obviousness, 35 U.S.C. § 103. The district court, after thorough analysis of the prior art in light of ASM's arguments, sustained the validity of the patent. ASM appeals that ruling.

ASM relies on the combination of United States Patent 3,408,982 to Capita and a 1966 text by C.F. Powell discussing chemical vapor deposition. The Capita patent describes conducting CVD using radio frequency heating. The Powell text describes the use of both radio frequency and radiant heating of CVD chambers. The district court, after extensive testimony by both sides, found that "Powell expressly suggests the use of lamps as a radiant heat source only for small scale, low temperature applications," referring to the conclusion of Applied Materials' expert that "nothing in Powell contemplated substitution of heat sources at all." *Applied Materials v. ASM*, 32 U.S.P.Q.2d at 1875. The district court gave weight to the thinking of the art at the time of the invention, concluding that "the teaching of the Powell reference is that RF [radio frequency] heating is preferred for the design of CVD reactors." *Id.* at 1876.

ASM places heavy reliance on a ruling of the Court of Customs and Patent Appeals during prosecution of the '609 application. *In re McNeilly*, No. 79-562 (CCPA Nov. 1, 1979) (unpublished), 612 F.2d 585 (table). The examiner had rejected the claims for obviousness based on the Capita patent in view of the Powell text, stating that this combination presented a prima facie case of obviousness. The PTO Board of Appeals affirmed, as did

the C.C.P.A. The applicant then returned to prosecution before the examiner, filed a continuation application, amended the claims, filed objective evidence of the commercial success of the radiant energy process compared with the radio frequency process, and further described the unexpected results of enhanced thermal stability, reduced crystallographic slip,[4] and more uniform deposition layers. The examiner eventually allowed the claims.

When a patent has been examined and duly granted, judicial review must give due weight to the presumption of validity. 35 U.S.C. § 282 ("A patent shall be presumed valid.") The presumption of validity is based on the presumption of administrative correctness of actions of the agency charged with examination of patentability. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1139, 227 U.S.P.Q. 543, 548 (Fed. Cir. 1985) (the government agency is presumed to have done its job). It was thus incumbent upon ASM to prove invalidity by clear and convincing evidence. The presentation at trial of additional evidence that was not before the PTO does not change the presumption of validity or the standard of proof, although the burden may be more or less easily carried because of the additional evidence.

ASM argues that the district court should have accepted the holding of the C.C.P.A. in *In re McNeilly* and declared the '609 patent invalid. However, in *Applied*

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[4] Crystallographic slip occurs when thermal stresses within the substrate or coating cause adjacent layers of molecules to move relative to each other, thus disrupting the pattern of the deposition.

Materials, Inc. v. Gemini Research Corp., 835 F.2d 279, 281, 15 U.S.P.Q.2d 1816, 1818 (Fed. Cir. 1988), this court pointed out that the C.C.P.A.'s decision in *In re McNeilly* did not give rise to an estoppel because new and material evidence was presented in the PTO during the continuation of examination after the C.C.P.A. decision. The PTO's decision to grant the patent was reached after consideration of all the evidence including the new evidence filed on return to examination. It thus became irrelevant, at this later stage, that less than all the evidence had at an earlier stage presented a prima facie case of obviousness.

Although ASM argues that the district court did not accord the opinion of the C.C.P.A. proper weight, it was pointed out in *Applied Materials v. Gemini Research* that the C.C.P.A. in *In re McNeilly* did not hold that the '609 invention was unpatentable for obviousness; the C.C.P.A. held that the examiner had made a prima facie case of obviousness on the evidence that was then of record. In *Gemini Research* this court held that summary judgment based on *In re McNeilly* was improperly granted. Thus the district court in the case at bar correctly held that there was not collateral estoppel based on *In re McNeilly*.

ASM also argues that the C.C.P.A.'s decision in *In re McNeilly* is "highly persuasive" that the invention is prima facie obvious, and that the district court should have accepted that premise and considered only whether that prima facie case was successfully rebutted. ASM argues that the objective evidence was insufficient to overcome the prima facie case of obviousness. However, the determination of obviousness, vel non, requires that all the evidence be considered together. As explained in *In re*

Piasecki, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984), "[i]f rebuttal evidence of adequate weight is produced, the holding of prima facie obviousness, being but a legal inference from previously uncontradicted evidence, is dissipated." The objective evidence of unobviousness is not evaluated for its "separate knockdown ability" against the "stonewall" of the prima facie case, *In re Rinehart*, 531 F.2d 1048, 189 U.S.P.Q. 143 (C.C.P.A. 1976), but is considered together with all other evidence, in determining whether the invention as a whole would have been obvious to a person of ordinary skill in the field of the invention.

At trial to the district court, Applied Materials presented additional objective evidence of unobviousness including evidence that four major companies (Motorola, Western Electric, Texas Instruments, and Merck) had tried unsuccessfully to develop lamp-heated CVD reactors. There was evidence of the unsuccessful attempts of these and other companies to achieve the enhanced temperature uniformity and improved chemical deposition that were achieved using the '609 process. Witnesses described the "skepticism," "misgivings," and "disbelief" in the industry when Applied Materials achieved these superior results with a radiant heating process. The district court was required to consider this evidence along with the other evidence in determining whether, on the totality of the evidence, invalidity on the ground of obviousness had been proved by clear and convincing evidence.

ASM challenges the evidentiary value of the objective evidence of commercial success on the added ground that the claims are broader than Applied Materials' successful commercial embodiment. However, a patentee need not

show that all possible embodiments within the claims were successfully commercialized in order to rely on the success in the marketplace of the embodiment that was commercialized.

All of the facts relevant to the issue of obviousness were before the district court, including the decision of the C.C.P.A., the prosecution history in the PTO, and the evidence adduced at trial. After examining the evidence with the assistance of expert witnesses and advocates for both sides, the district court concluded that ASM had not met its burden of proving that a person skilled in this field would have been motivated by the teachings of the prior art to change from the radio frequency state-of-the-art process to a radiant heat process. No error of fact or law has been shown in that analysis. We affirm the district court's conclusion that the '609 patent is not invalid on the ground of obviousness[5]

II
THE '389 (LOGAR) PATENT

The '389 patent is directed to the reduction or elimination of static electricity during the CVD process. The elimination of static charges on the substrate and throughout the chamber results in purer deposition and

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[5] Applied Materials has moved this court to take judicial notice of an assertedly inconsistent position of ASM in related litigation concerning the '609 patent. In view of our decision upholding the validity of the '609 patent on the grounds presented, the question of judicial estoppel need not be considered in this case. The motion is dismissed as moot.

fewer defects in the finished product, since static electricity is one of the mechanisms whereby contamination of the deposited layer occurs. The district court found that ASM's Epsilon One process did not literally infringe the '389 claims in suit, but that it was an infringement by application of the doctrine of equivalents.

A typical CVD process of the prior art, as described in the specification of the '389 patent, includes several "purge" steps in which the atmosphere in the chamber is replaced by other gases. The first purges occur after the substrate is loaded in the chamber and air is replaced with nitrogen and then hydrogen; the substrate is then heated and the circuitry etching and chemical vapor deposition steps are performed, with subsequent purges occurring whenever one atmosphere is replaced by another. Static electricity is generated during the initial "cold" purge steps of the process. As explained in the '389 specification, static charges are not a problem during subsequent purges of the chamber because after the initial steps the temperature of the chamber remains above about 180 degrees C, the temperature above which static charges do not exist.

In the invention of the '389 patent, static charges during the initial "cold" purges are eliminated by operating the lamps at a low level during the initial gas flow steps. Claim 1 describes the energy level as a "relatively low flux intensity," and claim 4 describes the invention in terms of heating the substrate to between 180 degrees C and the gas phase processing temperature:

> 1. In a cold purge process for preparing a reactor chamber for the gas phase formation of an epitaxial layer on a wafer positioned within the reactor

chamber by communicating a flow of conditioning gas into the reactor chamber, the reactor chamber system including radiant energy lamp means for heating the chamber to effect said gas phase processing, the improvement comprising:

during said gas flow step, operating the radiant energy lamp means at a power level below that used for said gas phase processing heating to supply radiant energy at a relatively low flux intensity to substantially eliminate static-induced particle transport to the wafer.

4. An improved purge process for conditioning a cold semiconductor reactor chamber for gas phase processing of a wafer therein prior to heating the wafer for the gas phase processing, comprising flowing at least one purging gas through the chamber and, during said purging step, heating the wafer to a temperature between about 180 degrees C. and below said gas phase processing temperature, for decreasing electrostatic attraction between the wafer and particulates.

The '389 specification describes this initial, gaseous purge as conducted at low lamp power, about six to ten percent of the deposition level. In ASM's Epsilon One reactor this initial purge is conducted above about 850 degrees C. Although the Epsilon One purge temperature is still below the gas phase processing temperature, ASM's position is that it does not conduct a "cold" purge at all, but that its initial purge is really a "hot" purge and unrelated to the removal of static-induced contamination, as the claims in suit require, because such contamination does not form

under the Epsilon One conditions. Thus ASM argues that although its initial purge steps ostensibly occur within the temperature limits stated in the claims, the other claim limitations of cold purge process, cold reactor chamber, and elimination of electrostatic particles, are not met literally or equivalently.

Literal Infringement

The '389 patent contemplates a CVD process sequence that starts with a cold reactor chamber, the chamber having been cooled in order to permit the operator to remove the coated substrates and insert uncoated ones. The '389 claims are directed to the removal of static attraction during the gaseous purge of the cooled chamber within which electrostatic contamination has formed. Although the parties dispute whether this requires treating at a "relatively low" temperature that is high enough to eliminate the static charges, or is accomplished solely by an infrared photon flux at low intensity, claim 1 appears to include both mechanisms, while claim 4 is specific to heating the wafer above about 180 degrees C. The '389 patent describes about 180 degrees C as the temperature above which static electricity does not form or exist.

The ASM Epsilon One reactor process also conducts an initial purge with inert gases as the first step in the deposition cycle. However, this purge is conducted at about 850 degrees C. Since in the Epsilon One reactor the substrates are removed and replaced mechanically, the chamber need not be cooled significantly to perform this step and does not acquire electrostatic contamination during the processing cycle. Thus although the Epsilon One process includes an initial gaseous purge below the

deposition temperature, the temperature of this purge is stated to remain above 850 degrees C. ASM argues that this can not reasonably be deemed a "cold purge process." ASM states that the problem solved by the '389 invention does not exist at the Epsilon One operating conditions, and that the '389 specification makes clear that the invention relates to a process wherein the chamber is cooled to ambient temperatures, permitting electrostatic contamination to form, in order to remove it by raising the temperature to above 180 degrees C, but still at relatively low temperatures. ASM points out that the prior art shows the initial cold purging with inert gases, and that the sole "inventive" contribution of the '389 patent is removal of the electrostatic contamination that occurred below about 180 degrees C. ASM states that under its operating conditions, which do not drop below 850 degrees C during or between processing cycles, electrostatic contamination does not occur, and thus that it does not practice the invention of the '389 patent.

Applied Materials states that "cold purge" is a word of art for the initial gas purge step, and that "cold" is understood in this art as a relative term and means a temperature below the processing temperature. Applied Materials states that the claims require only that the initial gaseous purge is conducted below the processing temperature, and that ASM does so, literally. Applied Materials states that it is the claims that define the invention, and that it is incorrect to limit the claims to any specific temperature mentioned in the specification. Thus Applied Materials states that claim 1 reads literally on the Epsilon One process.

The construction of patent claims, as well as the meaning and scope of a disputed technical term or terms of art in a patent claim, are deemed to be questions of law and are determined de novo on appeal. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 34 U.S.P.Q.2d 1321 (Fed. Cir. 1995) (*en banc*), *aff'd*, 134 L. Ed. 2d 577, 116 S. Ct. 1384 (1996). Although this court requires that no deference be given to the testimony of experts, *id.* at 983, 34 U.S.P.Q.2d at 1333 ("when legal 'experts' offer their conflicting views of how the patent should be construed, or where the legal expert's view of how the patent should be construed conflicts with the patent document itself, such conflict does not create a question of fact nor can the expert opinion bind the court or relieve the court of its obligation to construe the claims according to the tenor of the patent. This opinion testimony also does not change or affect the de novo appellate review standard for ascertaining the meaning of the claim language."), we take note that extensive expert testimony was adduced at trial.

The district court first considered Applied Materials' argument that since the phrase "cold purge" appears only in the preamble of claim 1, it does not limit the claims as applied to the accused process. The district court concluded that "cold purge" is indeed an element of the claims, and "establishes a limitation which the accused device must meet in order to literally infringe the '389 patent." We reach the same conclusion.

Whether a preamble stating the purpose and context of the invention constitutes a limitation of the claimed process is determined on the facts of each case in light of the overall form of the claim, and the invention as

described in the specification and illuminated in the prosecution history. *See In re Stencel*, 828 F.2d 751, 754, 4 U.S.P.Q.2d 1071, 1073 (Fed. Cir. 1987) (the preamble is interpreted in light of the invention as a whole); *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 896, 221 U.S.P.Q. 669, 675 (Fed. Cir.), *cert. denied*, 469 U.S. 857, 83 L. Ed. 2d 120, 105 S. Ct. 187 (1984) (the limitations stated in the preamble give meaning to the claim and can serve to define the invention). It is thus appropriate to determine whether the term in the preamble serves to define the invention that is claimed, or is simply a description of the prior art.

The term "cold purge" has its roots in the specification, which states that in a typical deposition process of the prior art "both the nitrogen prepurge and hydrogen purge are carried out 'cold', that is, without heating." The specification explains that in the '389 process these initial purges are carried out at low radiant energy or low thermal energy. The district court found that "cold purge process" means temperatures below 180 degrees C, and that the '389 invention was directed to the use of heat sufficiently high to remove electrostatic contamination in the initial purge steps, that is, heat above about 180 degrees C, in a reactor whose operating conditions include temperatures below 180 degrees C. "Cold purge" is interpreted in light of the problem the '389 patent solved: the elimination of electrostatic contamination during the initial purge step. The specification states:

> During the use of the above outlined process sequence, electrostatic attraction is operative almost exclusively during the cold purging steps (steps 1 and 2). It is substantially non-existent when the

> susceptor/wafer is at an elevated temperature, such as for example above about 180 degrees C.

'389 patent, column 9, lines 17-22. The specification also states that the purpose of the invention is the removal of contamination caused by this electrostatic attraction. Claims 1 and 4 include this requirement.

The district court correctly placed the term "cold purge process" in the context of the state of the art when the '389 invention was made. This context requires construing the literal meaning of the claims as limited to the process wherein electrostatic contamination is formed and removed. The Epsilon One reactor does not meet this criterion. We affirm the court's ruling that claim 1 is not literally infringed.

The district court had previously held, on a motion for summary judgment, that claim 4 of the '389 patent is not literally infringed because it contains the limitation "for conditioning a cold semiconductor reactor chamber" in its preamble. *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, No. C-91-20061-RMW(EAI) (N.D. Cal. Jan. 28, 1993). Applied Materials does not challenge this ruling on appeal.

The Doctrine of Equivalents

The district court found that claims 1 and 4 were infringed under the doctrine of equivalents. The court found that the initial purge steps of the Epsilon One reactor performed substantially the same function as that of the '389 initial purge and achieved the same result, in that static electricity was prevented from forming. The court

found that the way the Epsilon One performed this function, by conducting the initial gaseous purge above the temperature at which static electricity can exist, was substantially the same as the way in which the '389 invention would, for in both cases static-induced contamination was eliminated by the application of heat. Concluding that the differences between the purge processes of the '389 invention and the Epsilon One reactor were insubstantial, the district court found infringement under the doctrine of equivalents.

Infringement may be found under the doctrine of equivalents although the claim limitations are not literally met, if the accused process is substantially the same as the patented process. *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 35 U.S.P.Q.2d 1641 (Fed. Cir. 1995) (*en banc*), *cert. granted*, 116 S. Ct. 1014, 134 L. Ed. 2d 95 (1996). Guidance for the determination of equivalency is provided in *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 85 U.S.P.Q. 328, 94 L. Ed. 1097, 70 S. Ct. 854 (1950), the Court holding that equivalency may be found if the accused process performs substantially the same function as the patented process in substantially the same way to obtain the same result. The doctrine of equivalents enables the trier of fact to achieve a just result when the circumstances warrant, preventing "the unscrupulous copyist [from making] unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law." *Id.* at 607, 85 U.S.P.Q. at 330. The Court thus recognized that the claiming process is not perfect, and that judges are no less empowered to reach a just result in patent cases than in any other cause.

ASM argues that this finding of equivalency is clearly erroneous, and that there are substantial differences between the purge processes of the '389 patent and the Epsilon One. ASM argues that while both processes purge at temperatures at which static electricity does not form, in the Epsilon One reactor there is no static-induced contamination to remove. ASM refers to the '389 specification, which distinguished the initial gaseous purge and removal of the static electricity that is formed at ambient temperatures, with later process steps in which the higher heat within the reactor prevents electrostatic contamination:

> Since the processing steps commencing with the ramp up (step 3) are either conducted at elevated temperatures or, in the case of the end nitrogen and hydrogen purges are conducted in a reactor in which there is considerable residual heat in the susceptor and elsewhere, electrostatic attraction is substantially eliminated by thermal energy.

'389 patent, column 9, lines 22-28.

ASM stresses that the invention of the '389 patent is directed to the removal of electrostatic contamination, and that the claims so require; and that the Epsilon One reactor operates at temperatures at which electrostatic contamination does not occur. Although patent claims are not ordinarily limited to the inventor's purpose, when that purpose is included in the claims it serves as a limitation of the claimed invention and should be met either literally or equivalently in order to satisfy the criteria of infringement. Thus although infringement is not avoided if the accused device performs an additional function beyond what is

claimed, the device must nonetheless meet the requirements stated in the claim, literally or equivalently.

In this case the "cold purge process," understood in light of the description of the '389 invention, requires the function of removing the electrostatic contamination that is formed at low temperatures. That function is not performed in the Epsilon One. By mechanical loading and unloading of its chambers at 850 degrees C, the Epsilon One process is conducted without the formation of electrostatic contamination. There is no interim cooling of the Epsilon One reactor to below about 180 degrees C, and thus electrostatic attraction does not form and is not removed as claim 1 requires. This is not an insubstantial difference, *Hilton Davis*, 62 F.3d at 1518, 32 U.S.P.Q.2d at 1645, and precludes infringement of claim 1 under the doctrine of equivalents.

Applied Materials points out that claim 4 does not contain the "cold purge process" limitation, but describes the initial purge as for "conditioning a cold semiconductor reactor chamber." However, as the district court correctly determined, a cold reaction chamber, as that term is used in the '389 patent, is one in which static electricity can form, i.e., one whose temperature is below about 180 degrees C. The Epsilon One reactor is heated at about 850 degrees C while new substrates are loaded. Claim 4, like claim 1, expressly requires "decreasing electrostatic attraction" during the purging step. We conclude that the differences between the Epsilon One process and the process of claim 4 are not insubstantial, for they do not perform this function literally or equivalently. We conclude that the district court's finding of infringement by equivalency is clearly in error.

The ruling of infringement of the '389 patent in terms of the doctrine of equivalents is reversed.

III
THE '313 PATENT

Chief Judge Archer and Circuit Judge Mayer concur in affirming the judgment of invalidity of the '313 patent, thus the judgment is affirmed.

Circuit Judge Newman dissents.

COSTS

No costs.

AFFIRMED IN PART, REVERSED IN PART, AND REMANDED MOTION DISMISSED

DISSENT

ARCHER, Chief Judge, concurring in the judgment of invalidity of the '313 patent and dissenting from the judgment of invalidity of the '609 patent.

I join the majority's holding that the '389 patent was not infringed. I conclude, however, that the '313 patent is invalid because of the on-sale bar under 35 U.S.C. 102(b) (1994), and that the '609 patent is invalid for double patenting.

I.

With regard to the '313 patent, the claims of the patent, in my view, are not enabled by the 1969 parent application for the '712 patent and are, therefore, not entitled to priority based on the filing date of that application. As a result, the priority date of the '313 patent is its filing date. Because it is undisputed that a sale of the claimed invention occurred more than one year prior to the filing date of the '313 patent, that patent must be held invalid under 35 U.S.C. § 102(b).

Under 35 U.S.C. § 120 a claim in a continuation-in-part application that is directed solely to subject matter adequately disclosed under 35 U.S.C. § 112, first paragraph, in the parent application is entitled to claim priority from the filing date of the parent application. *Transco Prods. Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 557 n.6, 32 U.S.P.Q.2d 1077, 1082 n.6 (Fed. Cir. 1994). If the claim, however, recites a feature which was first introduced in the continuation-in-part application and was not adequately disclosed in the parent application, that claim in the continuation-in-part application is not entitled to the filing date of the parent application. *Id.*, at 557 n.6, 32 U.S.P.Q.2d at 1082 n.6.

One of the requirements of § 112, first paragraph, for an adequate disclosure is that the invention must be described in "such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains"

to make and use the invention.[1] § 112, ¶ 1; *Kennecott Corp. v. Kyocera Int'l, Inc.*, 835 F.2d 1419, 1421, 5 U.S.P.Q.2d 1194, 1196-97 (Fed. Cir. 1987). The issue of whether a disclosure is enabling is a matter of law. Lindemann aschinenfabrik *GMBH v. American Hoist and Derrick Co.*, 730 F.2d 1452, 1463, 221 U.S.P.Q. 481, 489 (Fed. Cir. 1984).

In this case, the district court determined that the '313 patent is entitled to the filing date of the 1969 application for the '712 patent. The court recognized that the '313 patent claimed a particular way to reduce crystallographic slip, specifically using "same side" lamp heating. In this process, the heating lamps are placed on the same side of the susceptor as the substrate to heat the substrate directly. The court noted that Figure 6 of the 1969 application shows "same side" lamp heating. Based solely on that figure, the court concluded that the 1969 application inherently enabled the '313 patent. The court made this determination even though the trial testimony was equivocal on whether operation of Figure 6 would produce a product free of crystallographic slip and despite its conclusion that using the reactor shown in Figure 6 in accordance with the 1969 application would not guarantee freedom from slip from all causes. Significantly, even one of the inventors could not testify that the operation of Figure 6 would necessarily produce a slip-free product.

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[1] Because I conclude that the claims of the '313 patent are not enabled by the 1969 application, I do not reach the question of whether the best mode requirement of § 112, first paragraph, is satisfied.

The district court erred in its inherency analysis. "[I]t is not sufficient that a person following the disclosure might obtain the result set forth in the [claim]; it must invariably happen." *Gubelmann v. Gang*, 56 C.C.P.A. 1013, 408 F.2d 758, 766, 161 U.S.P.Q. 216, 222 (C.C.P.A. 1969). In this case, nothing in the 1969 application or in the record before the court shows that a material without crystallographic slip would invariably result from operation of Figure 6.

The claims of the '313 patent are specifically directed to a method for heating substrate members formed of a single crystal material with "substantially no crystallographic slip." An extensive disclosure concerning crystallographic slip and how to avoid it was added to the application for the '313 patent. For example, the new disclosure in the application for the '313 patent describes how thermal gradients and less than perfect contact between the substrate and the susceptor cause slip and it describes how these problems may be avoided. These features are specifically recited in claim 1[2]. The '712 patent, on the

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[2] Claim 1 is as follows:

1. A method for heating a plurality of substrate members formed of a single crystal material with substantially no crystallographic slip in a process for the formation of semiconductor regions by epitaxial growth, said method comprising the steps of:

placing the substrate members in intimate contact with a susceptor body on one side of the same in a cool wall reaction chamber,

heating the substrate members and the susceptor body directly and simultaneously in an unfocused, substantially uniform field of radiant heat energy produced by a bank of high intensity radiant heat lamps located on the same side of the susceptor body

other hand, does not even mention slip or crystallographic slip. While the original application shows generally same-side heating in Figure 6, it does not show or teach how to produce material with substantially no crystallographic slip. This method of producing no crystallographic slip is first disclosed in the '313 patent.

Because the claims of the '313 patent are all directed to new matter introduced in the continuation-in-part application which is not described or disclosed in the 1969 application, I conclude they are not entitled to the benefit of the filing date of the 1969 application. Accordingly, the '313 patent should be held invalid under 35 U.S.C. § 102(b).

II.

The double patenting issue concerns two competing interests: protecting a patentee from the consequences of the Patent & Trademark Office's (PTO) restriction practice, *Studiengesellschaft Kohle mbH v. Northern Petrochem. Co.*, 784 F.2d 351, 358, 228 U.S.P.Q. 837, 842 (Fed. Cir. 1986) (Newman, J., concurring); and protecting the public from an unjustified extension of the patent term and, thus,

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as the substrate members,

whereby the substrate members are heated uniformly and without appreciable thermal gradiants by a combination of direct radiation from the heat lamps and heat transfer from the susceptor body, and

introducing a gaseous reactant into the reaction chamber to effect deposition of a chemical vapor coating on the substrate members.

the patentee's right to exclude. *In re Kaplan*, 789 F.2d 1574, 1579-80, 229 U.S.P.Q. 678, 683 (Fed. Cir. 1986).

A restriction requirement is made during the prosecution of a patent application at the discretion of the Commissioner to avoid granting a patent for more than one invention. See 35 U.S.C. § 121 ("If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions."). The Commissioner has issued strict guidelines in the Manual of Patent Examining Procedure (MPEP) to the examining corps as to when a restriction is appropriate. See MPEP § 803.01 (6th Ed. 1995) ("Since requirements for restriction under Title 35 U.S.C. 121 are discretionary with the Commissioner, it becomes very important that the practice under this section be carefully administered."). The restriction requirement also preserves revenue to the PTO and ensures the integrity of the PTO's classification system. See 3 Donald S. Chisum, Patents § 12.01 at 12-2 (1995) ("Restriction is imposed to prevent subversion of the statutory fee structure for the application for and issuance of patents and to preserve the integrity of the system of examination and classification within the Patent and Trademark Office.").

While a restriction is made to ensure there is only one invention per patent, double patenting is concerned with the opposite problem, ensuring there is only one patent granted per invention. The policy underlying a double patenting rejection is an important policy because it precludes the improper extension of the statutory term of patent protection for an invention. This policy is likewise applicable to the judicially created doctrine of

obviousness-type double patenting. *Gerber Garment Technology, Inc. v. Lectra Sys.*, 916 F.2d 683, 686 16 U.S.P.Q.2d 1436, 1439 (Fed. Cir. 1990) (Obviousness -type double patenting involves claims in two applications or patents that "were drawn to inventions so very much alike as to render one obvious in view of the other and to effectively extend the life of the patent that would have the earlier of the two issue dates."). For obviousness-type double patenting, this problem can sometimes be avoided for co-owned patents or applications through the use of a terminal disclaimer. *In re Longi*, 759 F.2d 887, 894, 225 U.S.P.Q. 645, 649 (Fed. Cir. 1985)

Section 121 of Title 35 affords some protection against arguments of double patenting for a patent issued on a divisional application that was filed as a result of a restriction requirement. Specifically, the third sentence of § 121 provides:

> A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them.

This court has ruled, however, that the protection of § 121 is only available for claims issued on a divisional application that are consonant with the examiner's restriction requirement. *Gerber*, 916 F.2d at 688, 16 U.S.P.Q.2d at 1440. In *Gerber* the court stated:

> Consonance requires that the line of demarcation between the "independent and distinct inventions" that prompted the restriction requirement be maintained. Though the claims may be amended, they must not be so amended as to bring them back over the line imposed in the restriction requirement. Where that line is crossed the prohibition of the third sentence of Section 121 does not apply.

Id., at 688, 16 U.S.P.Q.2d at 1440.

In this case the claims as amended during prosecution of the divisional application crossed the examiner's precise and unambiguous line of demarcation. Thus, these claims cannot claim the protection of 35 U.S.C. § 121. Because the claims have lost the immunity of § 121, the claims must be held invalid for obviousness-type double patenting. Without this protection, Applied concedes that the claims as issued are obvious over the apparatus claims of the parent application.

The trial court erred in determining that consonance was not lost because the patents remain separately classified. The grounds for restriction are not solely dependant on separate classification. Section 121 permits a restriction for "independent and distinct inventions," which the PTO construes to mean that the sets of claims must be drawn to separately patentable inventions. See MPEP § 802.01 (stating that the term distinct means two or more disclosed subjects that while perhaps related, such as process and apparatus for its practice, "ARE PATENTABLE (novel and unobvious) OVER EACH OTHER (though they may each be unpatentable because of the prior art)"). The mere fact that there are separate

apparatus and method claims in the same application is not grounds for a restriction. *See Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1580, 19 U.S.P.Q.2d 1241, 1249 (Fed. Cir. 1991) (determining that method and apparatus claims are not necessarily directed to separate inventions). The PTO correctly recognizes these may be just two different ways of claiming the same invention.

Therefore, under the PTO guidelines for restricting claims covering an apparatus and method of using the apparatus, the examiner must show one way distinctiveness. See MPEP § 806.05(e). That is, either the apparatus or method must be capable of being practiced without the other. *Id.* In addition, the examiner must give a reason why it would be a burden to examine both sets of claims; commonly, the reason will be that there are separate classifications requiring independent searches. *Id.* at § 803. If both criteria are met, then the examiner may issue a restriction requirement.

In this case the examiner issued a restriction requirement between two sets of apparatus claims and a set of method claims. The examiner restricted the method claims from the apparatus claims on the grounds that they were limited to a gaseous epitaxial deposition process while the apparatus claims were not. Specifically, the examiner stated that the method claims were distinct from the apparatus claims because the apparatus "could be used for non-epitaxial deposition" and that, as a result, a restriction was necessary. Applied has not shown that it ever challenged the examiner's restriction or that the examiner's grouping of the claims was incorrect.

After the restriction, Applied filed the method claims in a divisional application that issued as the '609 patent fourteen years after the issuance of the patent on the parent application. The method claims in the '609 patent, however, were not limited to an epitaxial deposition process. During the prosection of the divisional application, the claims were amended to eliminate the epitaxial limitation. Thus, the very reason the examiner could and did require a restriction was eliminated. And, as Applied admits, but for the immunity of section 121, the method claims, which expire in 2002, are no longer patentable over the apparatus claims, which expired in 1988[3].

The majority opinion recognizes that loss of consonance may result in double patenting but concludes that in this case "consonance was not violated, for the process claims remained in separate patents from the apparatus claims although the scope of the process claims was modified." This is not the proper test and begs the very question we are asked to answer. Under this analysis no patent could ever be invalid for double patenting based on another patent because the claims would be in separate patents. Certainly that cannot be true. Indeed, in Gerber, this court held a patent that had been subject to a restriction requirement invalid for obviousness-type double patenting on the basis of the separate parent patent. 916 F.2d at 689, 16 U.S.P.Q.2d at 1441.

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[3] The patentees admitted during the prosecution of the '609 patent that the process of the '609 patent is the method of using the apparatus covered by United States Patent Nos. 3,623,712 and 4,047,496.

I do not suggest that after a restriction has been imposed claims may never be modified. Rather, as Gerber and the language of § 121 instruct, the issue is whether the inventions claimed remain independent and distinct. As discussed above, in this case the very reason the examiner said the inventions were distinct -- that the method claims were drawn to epitaxial deposition -- was eliminated. The modification of the claims to cover non-epitaxial deposition resulted in consonance being lost.

To support its conclusion that the examiner's line of demarcation among the separate inventions was not violated, the majority relies on *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 26 U.S.P.Q.2d 1018 (Fed. Cir. 1993). In that case, the examiner's groupings of the restricted claims was inconsistent with his written description of the groupings. When the validity of the patent resulting from the subsequent divisional application was challenged, we held that the actual restriction groupings, and not the written description of the groupings, controlled for purposes of determining whether subsequent amendments resulted in claims consonant with the restriction requirement. *Id.* at 1179, 26 U.S.P.Q.2d at 1029. Because the claims as amended were consonant with the "grouping restriction actually imposed by the examiner," the claims were protected under § 121 from allegations of double patenting. *Id.*, 26 U.S.P.Q.2d (BNA) at 1029. That is not the situation presented by this case. Here, the examiner's demarcation was clearly the epitaxial deposition method claims, and the examiner did not include claims directed to any matter outside that group.

While the examiner should have detected the loss of consonance, *see Gerber*, 916 F.2d at 685, 16 U.S.P.Q.2d at 1438 ("Non-compliance with the consonance requirement is normally detected by the PTC examiner."), the patentee is not shielded by § 121 merely because of the examiner's failure. For the protections of § 121 to apply, Applied had to keep the claims within the scope of the restriction requirement. *Gerber*, 916 F.2d at 688, 16 U.S.P.Q.2d (BNA) at 1440 (explaining that in order to gain the benefits of § 121, the patent applicant "must have limited the claims in its divisional application to the non-elected invention or inventions").

When Applied failed to maintain consonance with the restriction requirement by broadening its claims to cover non-epitaxial, as well as epitaxial, deposition methods, it sought to cover the same invention as claimed in its apparatus patent that expired in 1988. This double patenting improperly extends its patent right beyond the statutory term.

CONCURRING OPINION

MAYER, Circuit Judge, concurring in the judgment of invalidity of the '313 patent.

I believe that U.S. Patent No. 4,081,313 ('313 patent), a continuation-in-part of U.S. Patent No. 3,623,712 ('712 patent), failed to disclose the best mode for practicing the claimed invention. Inventors must update their best mode disclosure when filing a continuation-in-part which adds new matter pertinent to the best mode of practicing the invention claimed in the continuation-in-part. The inventors here did not do so, and the '313 patent is invalid.

In determining whether the '313 patent is invalid because of a sale that predated the filing date by more than one year, 35 U.S.C. § 102(b) (1994), the district court found that the '313 continuation-in-part application was enabled by the parent '712 patent and was entitled to the filing date of that patent. *Applied Materials Inc. v. Advanced Semiconductor Materials Am., Inc.*, 32 U.S.P.Q.2d 1865, 1879-80 (N.D. Cal. 1994). The district court then held that the '313 patent was invalid because the inventors added substantial new matter to the application but did not update the best mode for practicing the newly claimed invention. 32 U.S.P.Q.2d at 1880-82.

Relying on *Transco Products Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 U.S.P.Q.2d 1077 (Fed. Cir. 1994), Applied Materials argues here that the inventors were not obligated to update the best mode disclosure of the '313 patent because it was enabled by the '712 patent. This court adopts that position. But a continuation application, which was at issue in Transco, is fundamentally different from a continuation-in-part, which is at issue here.

To secure the benefit of the filing date of an earlier filed ("parent") application, 35 U.S.C. § 120 requires that the claimed invention be disclosed in the manner provided by the first paragraph of section 112[1], which requires 1) a

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[1] Provided other requirements not at issue here are met, "an application for patent for an invention disclosed in the manner provided by the first paragraph of [35 U.S.C. § 112] in an application previously filed in the United States . . . shall have the same effect, as to such invention, as though filed on the date

written description of the invention, 2) enablement, and 3) disclosure of the best mode for practicing the invention. Each of these disclosures is separately required before the later application is entitled to the filing date of the parent. *See Transco*, 38 F.3d at 556-57, 32 U.S.P.Q.2d at 1081-82 ("[S]ection 120 speaks of the first paragraph of section 112 as a whole." "Section 120 does not exempt the best mode requirement from its reach, and therefore this court must accept the plain and precise language of section 120 as encompassing the same.").

Although there may be some variation in the scope of the claimed subject matter, a continuation application is based solely on the disclosure of a parent application. See Manual of Patent Examining Procedure § 201.07 (6th Ed. 1995) (MPEP). By definition, a continuation adds no new matter and is akin to an amendment of a pending application. *Id.*; *Cf. Godfrey v. Eames*, 68 U.S. (1 Wall.) 317, 324-26, 17 L. Ed. 684 (1864). In addition to a continuation application, the Patent and Trademark Office also permits a continuation-in-part application which is only partially entitled to the benefit of section 120 because it contains new matter. MPEP § 201.08. "A [continuation-in-part] application can be entitled to different priority dates for different claims. Claims containing any matter introduced in the [continuation-in-part] are accorded the filing date of the [continuation-in-part] application. However, matter disclosed in the parent application is entitled to the benefit of the filing date of the parent application." *Waldemar Link, GmbH & Co. v. Osteonics Corp.*, 32 F.3d 556, 558, 31 U.S.P.Q.2d 1855, 1857 (Fed. Cir. 1994).

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of the prior application." 35 U.S.C. § 120 (1994).

Transco held that "an application is entitled to the benefit of the filing date of an earlier application as to common subject matter." 38 F.3d at 557, 32 U.S.P.Q.2d at 1082. Applied to the best mode requirement, this narrow statement means that an applicant is not required to update the best mode disclosure for continuation applications, which, of course, add no new matter, or for inventions claimed in continuation-in-part applications that are otherwise entitled to the filing date of a parent application because they meet all requirements necessary to gain the benefit of the earlier filing date. However, *Transco's* general discussion of "continuing" applications should not be thought to apply the same requirements to both types of "continuing" applications without considering the important differences between them. Both continuations and continuations-in-part may be referred to as "continuing" applications for some purposes, but they are different in important respects.

The district court cited conflicting authority, *Johns-Manville Corp. v. Guardian Indus. Corp.*, 586 F. Supp. 1034, 221 U.S.P.Q. 319 (E.D. Mich. 1983), *aff'd*, 770 F.2d 178 (Fed. Cir. 1985), and *Transco Products, Inc. v. Performance Contracting, Inc.*, 821 F. Supp. 537, 28 U.S.P.Q.2d 1739 (N.D. Ill. 1993), subsequently *rev'd*, 38 F.3d 551, 32 U.S.P.Q.2d 1077 (Fed. Cir. 1994), from which it determined "that resolution of the best mode issue in the instant case requires an inquiry as to whether the Continuation In Part Application contained the disclosures of material essential to successfully practice the invention and which significantly amended the disclosure of the parent in a fashion known to the inventors to constitute best mode for the practice of the invention." 32 U.S.P.Q.2d at 1881. It found that the continuation-in-part that matured

into the '313 patent specifically claimed the benefits of a method of preparing crystallographic wafers with minimal crystallographic slip. *Id.* at 1881-82. The court also found that the inventors knew of a preferred embodiment for practicing the method of the '313 patent before they filed their continuation-in-part application but failed to disclose it in the application.

The district court's analysis is sound. Whereas the '712 patent does not even contain the terms "slip" or "crystallographic slip," the '313 patent contains detailed information on how the claimed method heats a substrate formed of "a single crystal material with substantially no crystallographic slip[2]." It is beyond dispute that this information constitutes new matter and was at least one reason that the application was filed as a continuation-in-part, rather than a continuation. There is also no dispute over the factual findings that the inventors knew of a best mode of practicing the newly claimed invention and that they did not disclose it. The only argument is whether the district court's finding that the '313 patent was enabled by the '712 patent is sufficient to absolve the inventors of any duty to update the best mode in their continuation-in-part application.

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[2] The most specific newly added references to the absence of crystallographic slip and to single crystal films occur in the '313 patent at column 1, lines 35-40 and 53-55; column 2, lines 38-45 and 55-61; column 3, lines 5-9 and 13-16; column 4 lines 3-5 and 24-27; column 5, lines 16-20; column 6, lines 5-7; column 10, lines 38-46; and column 11, line 19, through column 12, line 16.

This court apparently overlooks that when the district court analyzed entitlement to the filing date of the parent it discussed only whether the '313 patent claims were enabled by the parent application, not whether they met the best mode requirement. *See* 32 U.S.P.Q.2d at 1879-80. Best mode is not the same as enablement. *Chemcast Corp. v. Arco Indus.*, 913 F.2d 923, 926, 16 U.S.P.Q.2d 1033, 1035 (Fed. Cir. 1990). Determining whether a patent complies with the best mode requirement involves two distinct factual inquiries that are different from what is required in determining whether the claimed invention is enabled. "First, it must be determined whether, at the time the patent application was filed, the inventor had a best mode of practicing the claimed invention." *U.S. Gypsum Co. v. National Gypsum Co.*, 74 F.3d 1209, 1212, 37 U.S.P.Q.2d 1388, 1390 (Fed. Cir. 1996). This "is wholly subjective and addresses whether the inventor must disclose any facts in addition to those sufficient for enablement." *Id.* (emphasis added). "A specification can be enabling yet fail to disclose an applicant's contemplated best mode." *Chemcast*, 913 F.2d at 928, 32 U.S.P.Q.2d at 1037. If the inventor contemplated a best mode of practicing the claimed invention, the court must then determine whether the specification adequately disclosed it so that those having ordinary skill in the art could practice it. *Id.* The district court performed this analysis without error.

The best mode requirement serves to "restrain inventors from applying for patents while at the same time concealing from the public preferred embodiments of their invention which they have in fact conceived." *Transco*, 38 F.3d at 559, 32 U.S.P.Q.2d at 1084 (citing *In re Gay*, 50 C.C.P.A. 725, 309 F.2d 769, 772, 135 U.S.P.Q. 311, 315 (1962)). If an inventor may file a patent application

disclosing only part of an invention, and then file a continuation-in-part adding substantial new matter without disclosing the best mode of what was newly added, the public will be deprived of the full invention claimed in the continuation-in-part application. It would behoove inventors to disclose only minimal parts of their inventions, and then submit continuations-in-part to claim the rest. They could thereby hide the commercial value that resides in the best mode of practicing their inventions and gain the benefit of both the exclusionary right of the patent and the "quasi trade secret" of the best mode.

This case highlights the need for inventors to update a best mode disclosure when adding new matter. Although the disclosure of the '712 patent may have enabled one of ordinary skill in the art to practice the claimed process "with substantially no crystallographic slip," only the '313 continuation-in-part disclosed the advantages of the slip free process and specifically claimed it as the invention. In the interval, the inventors had developed a reactor that would optimize the advantages of this feature. To allow them to take advantage of the 1969 filing date almost 7 years later, add new matter to their application, and not require them to disclose the best mode of the newly claimed invention is a gross distortion of the bargain between the inventor and the public. *See Bonito Boats Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150-51, 109 S. Ct. 971, 103 L. Ed. 2d 118, 9 U.S.P.Q.2d 1847, 1852, 977-78 (1989).

NEWMAN, Circuit Judge, dissenting from the judgment of invalidity of the '313 patent.

I respectfully dissent from the judgment of my colleagues concerning the '313 patent, for their separate theories of invalidity are premised on the incorrect position that a continuation-in-part application is not entitled to the parent application's filing date, even when the claimed invention was enabled and the best mode requirement was met in the parent specification.

The '313 patent arose from the same parent application as did the '609 patent discussed, *supra*. It is not disputed that the enablement and best mode requirements were met when the parent application was filed. The district court held that the inventor was required to update the subject matter, including the design details of the commercial reactor, when the continuation-in-part was filed. In the later-overruled district court decision in *Transco Products, Inc. v. Performance Contracting, Inc.*, 821 F. Supp. 537, 28 U.S.P.Q.2d 1739 (N.D. Ill. 1993), a continuation application had been filed in accordance with patent office Rule 60 (permitting expedited refiling when the specification is unchanged), and the court held that the subject matter required full updating upon the refiling. The Federal Circuit reversed, and in a thorough opinion the court explained the principles embodied in the statute. *Transco Prods., Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 U.S.P.Q.2d 1077 (Fed. Cir. 1994), *cert. denied*, 130 L. Ed. 2d 1069, 115 S. Ct. 1102 (1995). Judge Mayer in his concurring opinion now applies that reversed decision, distinguishing the Federal Circuit's discussion as dictum, as I shall discuss.

Chief Judge Archer in his concurring opinion holds that the original filing date was lost because the applicant included in the continuation-in-part claims the additional

advantage of single-side heating, viz. reduced crystallographic slip. He would extinguish the parent filing date because an advantage of the patentee's method was not described in the parent specification. Thus there has been added to the patent practice of the Federal Circuit another useless pitfall, now punishing the patentee for disclosing in the continuation-in-part application an advantage of the method that was described and enabled in the parent specification. Both of the concurring opinions divest the continuation-in-part application of the benefit of the parent filing date, holding that it is insufficient that the parent specification enabled the invention that was common to the parent and the continuation-in-part, and that the best mode was described for that common invention as of its filing date. I can not agree.

In *Transco* the Federal Circuit explained that a rule that removed the benefit of the early filing for subject matter enabled therein would "subvert the patent system's goal of promoting the useful arts through encouraging early disclosure." 38 F.3d at 558, 32 U.S.P.Q.2d at 1082. The court explained that 35 U.S.C. § 120 establishes that when the application as initially filed complies with 35 U.S.C. § 112, that filing date continues to apply to claims to that subject matter.

The court in *Transco* discussed the relationship of § 120 and § 112 when the subsequent application is a continuation-in-part, that is, when additional subject matter has been added to the specification. The court explained that claims enabled by the original application do not lose their enablement when additional text is added to the specification:

> "Any claim in a continuation-in-part application which is directed solely to subject matter adequately disclosed under 35 U.S.C. § 112 in the parent application is entitled to the benefit of the filing date of the parent application. However, if a claim in a continuation-in-part application recites a feature which was not disclosed or adequately supported by a proper disclosure under 35 U.S.C. § 112 in the parent application, but which was first introduced or adequately supported in the continuation-in-part application such a claim is entitled only to the filing date of the continuation-in-part application."

Transco, 38 F.3d at 557 n.6, 32 U.S.P.Q.2d at 1082 n.6 (quoting the *Manual of Patent Examining Procedure* § 201.11)[1].

Thus this court in *Transco* explained that when the claims are entitled to the filing date of the parent application, they do not lose that entitlement when carried forward in a refiled application, whether that application is a Rule 60 "continuation" or a continuation-in-part. "The plain and unambiguous meaning of section 120 is that any application fulfilling the requirements therein 'shall have the same effect' as if filed on the date of the application upon which it claims priority." *Transco*, 38 F.3d at 556, 32 U.S.P.Q.2d at 1081 (quoting 35 U.S.C. § 120).

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[1] Judge Mayer observes that in *Transco* this discussion is dictum. It is simply a statement of existing law, the Transco court citing P.J. Federico, "Commentary on the New Patent Act," 35 U.S.C.A. § 1 (1954), pp. 31-33, and quoting the Manual of Patent Examining Procedure.

However, when claims in the continuation-in-part require the newly added matter for enablement, the best mode is measured as of the filing date governing those claims. *See, e.g., In re Chu*, 66 F.3d 292, 297, 36 U.S.P.Q.2d § 1089, 1093 (Fed. Cir. 1995) ("It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application ...."); *In re Hogan*, 559 F.2d 595, 194 U.S.P.Q. 527 (C.C.P.A. 1977) (different claims of continuation-in-part granted benefits of filing dates of different ancestral applications); *Wagoner v. Barger*, 59 C.C.P.A. 1213, 463 F.2d 1377, 1380, 175 U.S.P.Q. 85, 86-87 (C.C.P.A. 1972) ("The question in cases in which the parent application does not contain language contained in the claims of the later application is whether the language which is contained in the parent application is the legal equivalent of the claim language, in the sense that the 'necessary and only reasonable construction to be given the disclosure [in the parent application] by one skilled in the art,' *McNally v. Christmas Club*, [44 C.C.P.A. 861, 242 F.2d 776 (C.C.P.A. 1957)], is the same as the construction which such person would give the claims of the later application.")

The district court did not hold that any of the information that it stated should have been added to the specification was needed to enable the claimed invention. The holding was to the contrary, the court stating that "There is no evidence that, if operated by one skilled in the art to whom elimination of slip was an important consideration, the Figure 6 reactor would not eliminate the

slip caused by back side heating.") *Applied Materials*, 32 U.S.P.Q.2d at 1880. *Cf. In re Gay*, 50 C.C.P.A. 725, 309 F.2d 769, 771, 135 U.S.P.Q. 311, 314 (C.C.P.A. 1962) ("Since we are of the opinion that as originally filed, appellant's specification would have indicated to one skilled in the art that all suggested container materials were to be substantially non-porous, we hold that the insertion of this limitation expressly into the specification and claims did not involve 'new matter.'")

The invention claimed in the '313 patent is directed to ovens in which the lamps are on the same side of the susceptor as the substrate (called "same side heating" in the district court's opinion). That configuration was disclosed and enabled in the parent application. The applicant added some general explanatory text, but added neither a new invention nor broadened subject matter nor broadened claims.

There is not asserted to be any deficiency in either enablement or the best mode disclosure of the original application. The district court, like my colleagues on this panel, simply misstated the law in holding that "all of the features of the AMC-740 [the commercial reactor], whether they contributed to slip free performance or not, should have been disclosed." The district court did not limit this requirement to features related to same side heating. ASM in its brief, explaining the features that the district court had in mind (such as the oval shape of the reactor), does not mention anything related to same side heating. It appears that the district court had been persuaded that Applied Materials was required to include all subsequently developed aspects of its commercial apparatus, whether or not they were part of the invention claimed in the '313

patent. That is not the law. See Northern *Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941, 15 U.S.P.Q.2d 1321, 1329 (Fed. Cir. 1990) (patent document not intended to be a production specification); *In re Gay*, 50 C.C.P.A. 725, 309 F.2d 769, 773, 135 U.S.P.Q. 311, 316 (C.C.P.A. 1962) (the Board erred in requiring inclusion of the details of the product "as it is 'being marketed.'"); *Engel Indus., Inc. v. Lockformer Co.*, 946 F.2d 1528, 1532, 20 U.S.P.Q.2d 1300, 1302 (Fed. Cir. 1991) (a patent is not a "production specification") (quoting *In re Gay*, 309 F.2d at 774, 135 U.S.P.Q. at 316).

Prior to the uncertainties now raised by my concurring colleagues, each of whom imposes a different new obligation upon patent applicants, the law was that when the original specification is enabling, the best mode as to claims enabled by the original subject matter is measured as of the original filing date. When an application is refiled with newly added matter, the initial matter does not thereby lose its effective date, and claims that were initially enabled, and a specification that initially met the best mode requirement, do not lose their validity as to the common subject matter.

The district court erred in holding that Applied Materials was required to include in the continuation-in-part application all of the features of its commercial reactor, "whether they contributed to slip free performance or not." It is hard to imagine any continuation-in-part application that will not fail some judge's test and, as here, destroy the patent on a successful invention. This is of particular concern because should the United States adopt a first-to-file rule the pressures for early filing will increase, yet now the early filing date is

increasingly vulnerable to loss. This simply entraps the inventor. The ultimate loser will be the public, for patent applications will not be refiled, and the innovation incentive will be diminished.

The district court found as fact that the claims of the '313 patent were entitled to the filing date of the parent application. This finding was made in rejecting ASM's defense that the patent was invalid because of sales activity after the initial filing date but a year before the continuation-in-part application was filed. No error has been shown in this finding, which resolves the issue on appeal. I dissent, respectfully, from the contrary findings of my colleagues on this panel.

APPENDIX B

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

Appeal Nos. 94-1428, 94-1466

APPLIED MATERIALS, INC.,
Plaintiff/Cross-Appellant,
vs.
ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC. and EPSILON TECHNOLOGY, INC., d/b/a ASM EPITAXY,
Defendants-Appellants.

ON APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA IN C-91-20061 ENTERED JULY 15, 1994 AND AUGUST 11, 1994 BY JUDGE WILLIAM A. INGRAM

ORDER

A combined petition for rehearing and suggestion for rehearing in banc having been filed by the APPELLANTS, and the petition for rehearing having been referred to the panel that heard the appeal, and thereafter the suggestion for rehearing in banc having been referred to the circuit judges who are in regular active service,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petition for rehearing be, and the same hereby is, DENIED and it is further

ORDERED that the suggestion for rehearing in banc be, and the same hereby is, DECLINED.

The mandate of the court will issue on December 24, 1996.

Chief Judge ARCHER would rehear the appeal.

FOR THE COURT,
JAN HORBALY,
CLERK

Dated: December 17, 1996

By /s/ Brian P. LeDuc
Brian P. LeDuc
Associate Chief
Deputy Clerk

APPENDIX C

UNITED DISTRICT COURT FOR THE
NORTHERN DISTRICT OF CALIFORNIA

Civil Action No. C-91-20061 RMW

APPLIED MATERIALS, INC.,
Plaintiff/Counterdefendant,
v.
ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC. and EPSILON TECHNOLOGY, INC., d/b/a ASM EPITAXY, ADVANCED SEMICONDUCTOR MATERIALS INTERNATIONAL N.V.
Defendants/Counterclaimants.

April 16, 1996, Decided

MEMORANDUM OF DECISION

This action came duly on for trial on issues of liability only and, after a full and fair trial before this court without a jury, was argued both orally and on briefs, and was submitted for decision on August 20, 1993.

This Memorandum constitutes my Findings of Fact and Conclusions of Law Pursuant to Fed. R. Civ. P. 52(a). There is no dispute between the parties with respect to jurisdiction and venue.

The parties are APPLIED MATERIALS, INC., a California corporation, Plaintiff; and ADVANCED SEMICONDUCTOR MATERIALS INT. N.V. ("ASMI"), a Dutch corporation; ADVANCED SEMICONDUCTOR

MATERIALS AMERICA, INC., ("ASM AMERICA"); EPSILON TECHNOLOGY, INC., dba ASM EPITAXY ("ASM EPITAXY"), collectively called Defendants.

DECISION

1. The '712 patent is enforceable and infringed.

2. The '496 patent is enforceable and infringed only with respect to Claim 1C.

3. The '313 patent is invalid for failure to disclose the best mode for practicing the invention.

4. The '609 patent is valid, enforceable and infringed.

5. The '389 patent is infringed under the doctrine of equivalents.

The technology involved is apparatus and methods for the deposition of layers of semiconductor material such as silicon on wafers by chemical vapor deposition caused by the passage of a reactant gas over the wafers. The apparatus consists of a specially designed furnace in which a wafer or wafers are placed upon a support called a susceptor, and heated by means of a heat source so that the chemical deposition process can ensue. Epitaxial deposition is a form of chemical vapor deposition in which crystallographic layers are formed to have the same crystallographic structure as has the underlying wafer upon which the layers are deposited.

The purpose of chemical vapor deposition is to form integrated circuits on the wafers.

Plaintiff is the owner of the five patents in suit which are: U.S. Patent No. 3,623,712, ("the '712 patent"), issued November 30, 1971, to Michael A. McNeilly and Walter

C. Benzing, entitled Epitaxial Radiation Heated Reactor, which expired in 1988; U.S. Patent No. 4,047,496, ("the '496 patent"), issued September 13, 1977, to Michael A. McNeilly and Walter C. Benzing, entitled Epitaxial Radiation Heated Reactor, which expired in 1988 pursuant to a Terminal Disclaimer filed by Plaintiff; U.S. Patent No. 4,081,313, ("the '313 patent"), issued March 28, 1978, to Michael A. McNeilly and Walter C. Benzing, entitled Process for Preparing Semiconductor Wafers with Substantially No Crystallographic Slip, which will expire in 1995; U.S. Patent No. 4,496,609, ("the '609 patent"), issued January 29, 1985, to Michael A. McNeilly and Walter C. Benzing, entitled Chemical Vapor Deposition Coating Process Employing Radiant Heat and a Susceptor, which will expire in 2002; U.S. Patent No. 4,728,389, ("the '389 patent"), issued March 1, 1988, to Roger Logar, entitled Particulate-Free Epitaxial Process, which will expire in 2005.

The claims initially asserted of the '712, '496, '313, and '609 patent applications are all alleged to have been disclosed in the application filed by McNeilly and Benzing in 1969, which was found by the Examiner to be subject to restriction between distinct inventions, meaning that the Examiner found that two or more distinct inventions were claimed in the 1969 application, and that the applicants be required to restrict the application to one of those distinct inventions. The Plaintiff chose to restrict its application to the invention upon which the '712 patent issued, entitled Epitaxial Radiation Heated Reactor. The restriction finding and requirement gives rise to issues in this case raised by certain of the Affirmative Defenses which will be more fully articulated in connection with the discussion of those defenses.

Defendants have developed and marketed the Epsilon One Reactor, which is a single wafer reactor, in which the single wafer is placed upon a circular susceptor for processing, and which is loaded and unloaded from the susceptor by a mechanical arm. The requisite heat source consists of seventeen linear infrared lamps above and below the susceptor, and the loading and unloading of wafers is accomplished at a temperature of about 900 degrees C. The high temperature which persists throughout the operation of Epsilon One causes the quartz walls of the reactor to become sufficiently hot for film deposits to form on the walls, which are etched off following the processing of each wafer.

Plaintiff contends that Epsilon One infringes both literally and under the doctrine of equivalents each of the patents in suit. Plaintiff bears the burden of proof on the infringement issue by a preponderance of the evidence. *In re Hayes Microcomputer Products, Inc. Patent Litigation*, 982 F.2d 1527, 1541, (Fed. Cir. 1992). Defendants deny infringement and assert certain affirmative defenses as follows:

(1) The '609 patent is invalid for double patenting and because its claims are obvious in view of the prior art;

(2) The '313 patent is invalid because its claims are obvious in view of the prior art; because the AMC-740 was sold more than one year before November 29, 1972, the filing date of the continuation in part which included Claims 12-23 concerning slip upon which the '313 patent ultimately issued; and because Plaintiff's continuation applications which resulted in the issuance of the

'313 patent did not disclose the best mode of practicing the '313 invention which was known to the inventors at the time the continuation in part application was filed; and because the disclosure contained in Figure 6 of the Application of 1969 does not inherently produce slip-free results, *Gubelmann v. Gang*, 408 F.2d 758 (C.C.P.A. 1969);

(3) All four McNeilly and Benzing patents, '712, '496, '609 and '313, are unenforceable because they were issued as the result of inequitable conduct by reason of the execution of a false oath by inventors McNeilly and Benzing;

(4) The '496 patent is unenforceable because it was issued as a result of inequitable conduct by the inventors and their counsel in failing to disclose the Powell reference and the Nicoll reference;

(5) The '609 patent is unenforceable because it was issued as a result of inequitable conduct by the inventors and their counsel in failing to disclose to the Patent Office the Nicoll reference and by misrepresenting the Nicoll reference and by misrepresenting the British patent to Siemens, No. 1, 124,328.

Defendants have the burden of proving each affirmative defense by clear and convincing evidence. *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082 [227 U.S.P.Q. 337] (Fed. Cir. 1985); *see also*, 810 F.2d 1561 [1 U.S.P.Q.2d 1593] (Fed. Cir. 1987), *cert. denied*, 481 U.S. 1052 (1987); *Manville Sales Corp. v. Paramount Systems, Inc.*, 917 F.2d 544 [16 U.S.P.Q.2d 1587] (Fed. Cir. 1990.).

ENFORCEABILITY
A.
FALSE OATH

Defendants assert that McNeilly and Benzing falsely executed the oath providing in pertinent part as follows:

> We, Michael A. McNeilly and Walter C. Benzing, declare that we are respectively a citizen of the United States of America residing at the City of Saratoga, County of Santa Clara, State of California and a citizen of the United States of America, County of Santa Clara, State of California that we have read the foregoing specification and claims and we verily believe that we are the original, first and joint inventors of the invention in EPITAXIAL RADIATION HEATED REACTOR AND PROCESS described and claimed therein, that we do not believe that this invention was ever known or used before our invention thereof...

Defendants must prove by clear and convincing evidence that the oath in question constitutes an affirmative representation to the Patent Office made with the intent to deceive. The oath is claimed to be false because both McNeilly and Benzing knew that their invention was anticipated by a radiantly heated CVD epitaxial reactor with high intensity tungsten lamps surrounded by a quartz bell jar developed at Merck. Defendants claim that Claims 1 and 21 of the 1969 application encompassed and were anticipated by that Merck reactor. Both inventors signed a disclosure statement describing the Merck reactor and identifying it as prior art. Defendants rely on the testimony of Mr. Johnston, who testified that in addition to

the Merck work the inventors had knowledge of a material publication by Williams and Jackson, which knowledge also rendered the oath untrue.

However, with respect to the Merck issue, there is evidence before me that Dr. Benzing participated in the development of the Merck work. Mr. Johnston relied upon the deposition of one John Allegretti, an employee of Merck, as a basis for his opinion that Dr. Benzing was not a true inventor of some of the original claims of the 1969 application. Allegretti testified at deposition that Benzing was not involved in the decision to use lamps for epitaxial deposition. (Depo. 23:2-5; 73:5-19.) Johnston admitted that he had not read the deposition of another Merck employee, Schaarschmidt, who testified that Benzing directed the Merck work. (XXVII RT 3022:23-25; Depo. 95:12-96:5.)

Hence, as shown in XXIV-A RT pp. 2536:8-2538:11, Mr. Johnston found that the Merck work is relevant to the false oath contention because the deposition testimony of Allegretti stated:

> Q. Do you know whose decision it was to investigate radiant lamps as an alternative?
>
> A. I believe it was me. I believe it was me. This was important to Johnston's opinion because, in his view, unless Benzing conceived the idea of using radiant heat shining through a quartz wall to heat substrates, he could not be the first and original inventor as required by 35 U.S.C. § 15. Hence, in this respect says Johnston, his oath as contained in Exhibit 15 is untrue.

The Allegretti deposition testimony is mildly contradicted by the deposition testimony of Edward Schaarschmidt, a Merck employee, who was engaged in a different phase of the Merck work than Benzing and Allegretti. He said:

Q. Through your discussions with them, did they tell you whose idea it was to use radiant heating?
A. No.
Q. Do you know whose idea it was?
A. No, honestly, I don't.
A. I don't know. I would assume it was Walt Benzing. I'm assuming it was Walt Benzing.
Q. Can I ask you why you're assuming that?
A. Because he led the operations. He led it. He directed basically what we were going to do next. So I have to assume that basically you don't - Allegretti I'm sure wouldn't do this because it's a considerable expense. That thing costs a fortune to build and you have to have authorization to do that.

Depo. 95:12-96:5.

The false oath contention also includes a broad claim for a susceptorless reactor which was included by attorney Schlemmer for the purpose of obtaining an early citation from the Examiner of relevant prior art. Both Mr. Zimmerman and Mr. Schlemmer testified that this practice was common and not improper. (XXIX RT 3375:5-3376:16; 3517:10-13; 3518:11-21.) Zimmerman stated that the oath as applied to the susceptorless claim was, while

inaccurate, not improper and not motivated by an intent to deceive. (XXIX RT 3519:15-19.)

Mr. Johnston, in his testimony, also cited the preexisting knowledge by both inventors of the publication of the Williams and Jackson paper as evidence of false oath. (XXIV-A RT 2548:22-23.) It appears that the Williams and Jackson reference is relevant to the false oath issue only because it is thought by Mr. Johnston to anticipate Claim 1. (XXIV-A RT 2554:1-15.) As noted, Claim 1 of the originally filed claims, (Ex. 15), is the broad claim included for the purpose of inducing a comprehensive citation of prior art by the Examiner. If it is accepted, as it is by me, that the practice of filing such original claims for that purpose was countenanced by members of the Bar as well as by PTO examiners, then an intent to deceive cannot be predicated upon the execution of inventor's oath even though it was technically inaccurate. In like manner, the contradictory evidence surrounding Dr. Benzing's participation in the Merck work is insufficient evidence upon which to predicate an intent to deceive, as is the fact that the Williams and Jackson work anticipates original Claim 1.

In short, there is insufficient proof of intent to deceive the Patent Office by the intentional execution of a false oath.

Nor were the applicants under a duty to cite Merck work and Williams and Jackson as prior art, independent of the false oath contention.

In evaluating whether or not inequitable conduct has occurred as a result of a failure to cite alleged prior art, the court must determine:

> 1. Does it appear by clear and convincing evidence that the alleged prior art at issue was material? In making this determination, I elect to follow *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542 [220 U.S.P.Q. 103] (Fed. Cir. 1983), rather than *Fox Industries v. Structural Preservation Systems*, 922 F.2d 801 [17 U.S.P.Q.2d 1579] (Fed. Cir. 1990). Accordingly, I will apply the "but for" standard of materiality to facts occurring before 1977.
> 2. Does it appear by clear and convincing evidence that an applicant withheld or misrepresented prior art with an intent to deceive?

In view of Dr. Benzing's involvement in the Merck work as shown by the evidence (Allegretti, Schaarschmidt, Benzing), the evidence is not clear and convincing that the Merck work is prior art at all.

The showing of materiality and intent is therefore insufficient to prove inequitable conduct with respect to the Merck work.

Similarly, the evidence as to materiality and intent with respect to the Williams and Jackson reference is not clear and convincing so as to prove inequitable conduct based upon a failure to disclose that reference.

The evidence shows that the Williams and Jackson reference, (Ex. 590), was published in May 1969, (Ex. 713), and that the invention that formed the basis of the

1969 Application was conceived by the inventors in May 1968 and was reduced to practice in October 1968.

The Williams and Jackson reference was not prior art and was therefore not material to the application of 1969.

B.
CONCEALING THE MERCK REACTOR FROM THE PATENT OFFICE

If, as opined by Mr. Schaarschmidt, Dr. Benzing directed the radiant heat aspect of the Merck work, then that abandoned work would not be prior art against the inventor Benzing. If Mr. Allegretti is correct in his remembrance that he conceived and directed the radiant heat work at Merck, then Dr. Benzing derived his knowledge from that work in which he also participated, (Ex. 713), and patentability of the 1969 McNeilly-Benzing invention might be denied under 35 U.S.C. § 102(f), and the borrowing or derivation of the work of another would render the invention obvious under 35 U.S.C. § 103 and *Dale Electronics, Inc. v. R. C. L. Electronics, Inc.*, 488 F.2d 382, 386 (1st Cir. 1973).

The other ingredient to be considered is the deposition testimony of Dr. Benzing at page 21:15-21:

Q. Where did the idea for using radiant heating come from? Did you propose that, did McNeilly propose that or somebody else?
A. To the best of my recollection ...
Q. That's all you can give me.
A. ... I believe the original idea came from McNeilly.

In this state of the record I find it impossible to find by clear and convincing evidence that the Merck work was disclosable material prior art. Allegretti testified in deposition that the Merck work was a failure, and that it was abandoned. (Depo. 16:17-32.) Its materiality is therefore highly questionable.

C.
CONCEALING THE WILLIAMS AND JACKSON REFERENCE FROM THE PATENT OFFICE

As already pointed out, the conception and reduction to practice of the McNeilly-Benzing invention(s) as contained in the 1969 Application antedated the Williams and Jackson publication and the latter is not prior art. No PTO determination of that fact is necessary. *Reactive Metals Alloys Corp. v. ESM, Inc.*, 769 F.2d 1578, 1583 (Fed. Cir. 1985).

There is no clear and convincing evidence that Plaintiff or its assignors intentionally withheld the Williams and Jackson reference knowing that it was material and with the intent to deceive.

D.
FAILURE TO DISCLOSE POWELL IN THE '496 PROSECUTION

Defendants' contention is that although the relevant claims in the prosecution of the '496 and '609 patents were similar, and that the prosecutions were proceeding at the same time before different examiners, Plaintiff never disclosed to the '496 examiner that the analogous claims in

the '609 prosecution had been rejected six times over Powell. Defendants further contend that Plaintiff also made a misrepresentation to the '496 examiner that the Carter patent, upon which rejections had been premised, did not suggest infrared radiation as a heat source for a cool wall CVD reactor and that there was no basis in the prior art for the combination of Carter's lamps with Corria's CVD reactor, when the uncited and concealed Powell reference was prior art which suggested just that. Defendants cite XXIV-A RT 2565-2567 and Exhibit 13 at pp. 67-70. Defendants assert that Plaintiff's claims were allowed as the result of that misrepresentation, citing Exhibit 13 at 86. The Board of Patent Appeals found the Powell reference very material on appeal.

At XXIV-A RT 2570:7-25, Mr. Johnston stated that the non-disclosure of the Powell reference during the '496 prosecution in all the circumstances of the parallel '609 prosecution with its rejections over Powell constituted inequitable conduct under the guidelines set down by the U.S. Court of Appeals for the Federal Circuit because the Powell reference was highly material to the claims being prosecuted in the '496 application, and that the Powell reference to radiant heat shining through a quartz wall for a cool wall reactor was not present in the reference cited to the '496 examiner and argued as the reason for patentability. The '496 references relied upon were not as good as the Powell reference.

Nowhere does Mr. Johnston discuss the issue of intent. If a party makes a good faith judgment that withheld art is not material, there is no intent to deceive. (XXVI RT 2999:22-25.) Mr. Johnston testified that the '609 patent ultimately issued over Powell following the C.C.P.A.

decision and an amendment adding language specifying a susceptor being of substantially greater size than the substrate in order to emphasize the thermal flywheel effect. He testified that the '496 patent also required a thermal flywheel effect in the language of the claims, and that if the '609 patent was valid over the Powell reference after the addition of the language of the indicated amendment, then the '496 patent would also be valid over Powell because it also requires thermal flywheel effect. There is no direct evidence of an intent to defraud the Patent Office by not disclosing the Powell reference in the '496 prosecution. (XXVII RT 3044:20-3045:13.)

There is a lack of clear and convincing evidence sufficient to support an allegation of inequitable conduct in the prosecution of the '496 patent application with respect to the failure to cite the Powell reference.

E.
FAILURE TO DISCLOSE NICOLL IN THE '496 PROSECUTION

In 1977 Plaintiff sought patent protection in Germany for claims directly corresponding to those of the '496 patent. In 1963 Nicoll of RCA Laboratories published in the Journal of the Electrochemical Society an account of his work in using radiant heat lamps to produce epitaxial film on silicon wafers. In March of 1977 the German Patent Office rejected the claims corresponding to those of the '496 patent, relying upon Nicoll. Defendants allege that Plaintiff's counsel, Messrs. Schlemmer and Wright, knew or should have known of the materiality of the Nicoll reference to the claims of the '496 patent, and never disclosed that reference to the Patent Office in the course of the '496 prosecution.

The Nicoll reference concerns a close-spaced reactor, (XXVII RT 3046:2-5), and came to the attention of the German Patent Office from a company which was opposing the issuance of the German patent to Plaintiff and which cited Nicoll in the course of its opposition. (XXVII RT 3048:9-13.) The question of the materiality of a reference cited in a foreign patent prosecution is a determination in the first instance of the judgment of counsel. The prosecution on the merits of the '496 patent was declared closed by the Examiner by letter of October 1, 1976, and the German Patent Office's rejection did not occur until April 7, 1977. Moreover, in a subsequent appeal in the German proceeding, the court did not rely on the Nicoll reference and, in fact, found that the Nicoll reference did not fully disclose Plaintiff's claims pending in that prosecution. (Ex. 522 at 53, 53C; XXVII RT 3051:19-3053:16.)

In view of these circumstances, Plaintiff's failure to cite Nicoll in the '496 prosecution does not constitute inequitable conduct, because there is no clear and convincing evidence of materiality or of an intent to mislead the Patent Office.

F.
FAILURE TO DISCLOSE NICOLL IN THE '609 PROSECUTION

There is a question of the materiality as to '609. Mr. Johnston's opinion concerning the Nicoll reference vis-a-vis the '609 patent is that Nicoll was material to the '609 application and that, although Nicoll was cited by Plaintiff in the '609 proceeding, Plaintiff misrepresented Nicoll to the Patent Office in that Mr. Wright informed the

Examiner that "there is no suggestion in Nicoll that the graphite blocks operate as effective susceptors" and that the Nicoll reference could be characterized as a "hot wall" system.

A reading of the testimony contained in XXVII RT 3083:19-3088:11 indicates to me that the extreme likelihood is that no misrepresentation was made to the Examiner given the premises upon which Mr. Wright was proceeding in his disclosure.

Therefore I find that there was no inequitable conduct stemming from the representations made concerning Nicoll in the '609 prosecution.

Defendants contend also that alleged similarity between Nicoll and the Strehlow patent, a closed-space system, identified by the Examiner in the '609 patent as a critical piece of prior art, was not disclosed to the Patent Office. Strehlow was removed as a reference in the '609 prosecution pursuant to Rule 131. Defendants contend that because of Nicoll's early date of publication, Rule 131 procedures were not available to Plaintiff and that instead Plaintiff withheld its citation of Nicoll for a protracted period and finally misrepresented the characteristics of Nicoll, and never disclosed its close similarity to Strehlow, which was unquestionably material to the '609 prosecution. In sum, Defendants contend that Nicoll discloses the same reactor as does Strehlow. Mr. McNeilly stated in deposition and agreed at trial that there is no significant difference between the Strehlow and Nicoll reactors. (IV RT 416:17-417:7.)

In fact, as all agree, Nicoll was disclosed. If the features of Strehlow were material to the Examiner and the Nicoll reactor was substantially the same, its features were there to be seen by the Examiner. *Cf. Akzo N.V. v. U.S. Intern. Trade Comm'n*, 808 F.2d 1471 [1 U.S.P.Q.2d 1241] (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987).

The Nicoll contentions in this case rest against a background that at least one of the defense witnesses, Mr. Ferro, characterized close-spaced reactors, such as Nicoll, as non-analogous art. (XXVII RT 3128:20-22.)

Furthermore, Plaintiff's observation that Nicoll is cumulative art because it is referred to in Powell needs to be considered.

The burden of showing inequitable conduct by reason of the manner in which Nicoll was disclosed to the Patent Office in the course of the '609 prosecution has not been fulfilled. Strehlow was a close-spaced reactor which was of sufficient interest to the Examiner to cause Plaintiff to swear behind it pursuant to Section 131, but that circumstance of itself does not in my view render Nicoll material art in view of all of the foregoing considerations.

G.
FAILURE TO DISCLOSE ARTICLES BY DYER, ET AL.; HUFF, ET AL.; AND SEKI, ET AL., IN '313 PROSECUTION

The articles by Dyer, (Exs. 584, 714); Huff, (Ex. 579); and Seki, (Ex. 581), deal with the question of what temperature gradients contribute to causing of "slip." Mr. Johnston testified that the articles were highly relevant

because they were the only ones extant at the time of the '313 prosecution which discuss the causes of slip, (XXIV-A RT 2585:4-10), and that no other reference in the '313 file wrapper, cited by either the Examiner or the applicant touches on those causes, (XXIV-A RT 2588:3-15).

The Seki article, (Ex. 581), concludes "Dislocation [slip] free or nearly free epitaxial layers were obtained, grown on dislocation free substrates, when the temperature gradient was controlled within 3° C/CM." Defendants stress in argument that the '313 Examiner had no information on how much temperature gradient caused slip, and therefore the slip references under discussion are highly material. Mr. Johnston considers them "very material." (XXIV-A RT 2590:9-14.) Defendants contend that Plaintiff failed to cite these slip references in order to give itself room to distinguish the cited prior art on the basis that they do not achieve slip-free wafers, while at the same time withholding from the Examiner the slip articles which would have provided the Examiner a basis to evaluate the presence or absence of slip-free performance in the cited patents constituting the cited prior art. Defendants urge that this alleged conduct, coupled with the knowledge of Dr. Benzing of the cited articles as revealed by him in the Invention Disclosure Form, (Ex. 714), together with Attorney Wright's pronounced lack of memory as to why the articles were not cited provides evidence of the requisite intent.

The essence of Plaintiff's inequitable conduct argument is that the '313 patent does not disclose the amount of temperature gradient necessary to cause slip, and the three article references do reveal it. (Defendants' Post Trial Memorandum at 76.)

Plaintiff's contention is twofold on the issue:

(1) The three articles state the problem and not the solution. (Post Trial Brief at 225).
(2) Mr. Wright did not have a failure of recollection concerning the '313 prosecution, but recalled that he did not regard the three slip articles as material to the claims of the '313 patent. (Post Trial Reply Brief at 107; Post Trial Brief at 226, 227).

I tend to agree with Professor Oldham that the articles do more to state the problem than they do the inventive solution. (Oldham testimony, XXVIII RT 3251:9-3252:21.) Oldham points out that neither of the modalities of solution of the slip problem, use of lamps to heat and same side lamp heating to reduce slip, nor any other remedial measures, are discussed in the three articles. The three articles are not shown by clear and convincing evidence to be material. Therefore, inequitable conduct has not been shown.

H.
FAILURE TO DISCLOSE THE AMC-740 PRIOR SALE AND USE DURING PROSECUTION OF THE '313 PATENT

Plaintiff is of the view that the '313 patent claims are fully disclosed in the 1969 Patent Application and are, therefore, entitled to the same filing date priority as was the date of the Patent Application, October 15, 1969. Plaintiff contends that the sale of the AMC-740 was after that priority date and that the sale is, therefore, not

material to the '313 Application and, hence, there can be no misconduct based on non-disclosure of an immaterial reference.

Defendants' position is that the '313 patent is not entitled to the priority filing date and, even if it is, Plaintiff should have made the disclosure, allowing the PTO to make the priority filing date determination rather than making it unilaterally.

In its Reply, Plaintiff renews its contention of entitlement to the 1969 date and further contends that if there is no entitlement to the 1969 filing date, because the '313 application was not fully disclosed in the 1969 application, then Figure 6 was before the examiner in connection with the '712 patent prosecution and enablement was therefore shown by the disclosure of Figure 6 of "same side" lamp heating.

Without resolution of these questions at this point in the decisional process, I find that there is no showing of inequitable conduct based upon a failure to disclose the AMC-740 in the '313 prosecution because the requisite intent has not been demonstrated by clear and convincing evidence.

I.
FAILURE TO FULLY DISCLOSE AND MISREPRESENTATION TO THE PATENT OFFICE OF THE BRITISH PATENT TO SIEMENS

Defendants allege that late in the prosecution of the '609 patent Plaintiff described the Siemens patent but did not file a copy of it with the Patent Office. (Ex. 14 at 131.)

The alleged misrepresentation consists of failing to disclose a "pertinent embodiment," which was known to Plaintiff but not disclosed in its description, although it was included in the text of the patent. The embodiment revealed a reactor with a plate near the quartz wall with provision for cooling to keep the wall temperature low. Plaintiff's description of Siemens indicated that wafers rested directly on the bottom wall or on a plate which rested on the bottom wall, thus rendering Siemens a hot wall reactor. (Ex. 14 at 131.)

Defendants contend that the latter embodiment with wafers resting on a graphite plate near the base of the quartz chamber anticipates Claim 1 of the '609 application and is therefore a material reference which should have been correctly disclosed.

Defendants also allege that Plaintiff failed to disclose that Siemens teaches radiant heating in addition to the inductive and resistive heating techniques described by Plaintiff, and that Plaintiff's German application corresponding to the '609 application claiming a series of high intensity lamps emitting radiant heat was rejected on the authority of Siemens.

Defendants contend that Plaintiff's disclosure of the irrelevant embodiment and concealment of the relevant one demonstrates an intent to deceive given Plaintiff's full familiarity with the Siemens German language counterpart upon which Plaintiff's German application was rejected.

There was no culpable failure to disclose nor was there any misrepresentation. Plaintiff disclosed the Siemens patent to the Patent Office and it was fully before the

examiner, for whatever it was worth. *Haworth, Inc. v. Steelcase, Inc.*, 685 F. Supp. 1422, [8 U.S.P.Q.2d 1001] (W.D. Mich. 1988), *aff'd in relevant part*, 867 F.2d 615 [10 U.S.P.Q.2d 1251] (Fed. Cir. 1989). Even an incorrect characterization of prior art in a material respect will not amount to inequitable conduct in the absence of clear and convincing evidence of intent to mislead which is not present in this instance.

Initially, there is no evidence that what was said in Exhibit 14, or by Mr. Wright with respect to the heating modality disclosed by Siemens, was inaccurate, particularly in light of the testimony of Mr. Peltzer, (XXII RT 2218:13-15), and Mr. Johnston, (XXV RT 2755:8-12; XXV RT 2756:24-25), to the effect that Siemens does not disclose lamps as a heating source for the radiant heater disclosed in Siemens.

At XXIV-A RT 2602:18-2603:1, Mr. Johnston testified that he considered it to be inequitable conduct to characterize only part of the disclosure of Siemens and to withhold the most relevant part of the disclosure. This opinion is consistent with the Haworth, Inc. holding, and this court is not convinced by clear and convincing evidence that Plaintiff intended to defraud the Patent Office in its treatment of the Siemens reference.

VALIDITY

Defendants assert that two of the patents in suit are invalid. Defendants claim that the '609 patent is invalid because of double patenting, because its claims are obvious in view of the prior art, and because it is anticipated by Siemens. Defendants claim that the '313 patent is invalid

because its claims are obvious in view of the prior art because it fails to set forth the best mode known to the inventor for practicing the invention, and because an embodiment of the claims of the patent were on sale more than one year prior to the filing of the continuation in part application.

A.
'609 PATENT

1. Double Patenting.

At the time that the original McNeilly/Benzing Application was filed (the '473 Application, Exhibit 15), the Examiner issued a restriction requirement, identifying three distinct inventions:

> I. Claims 1-6 and 8-10 drawn to an oven-type radiation-heated reactor classified in Class 263, Subclass 41.
> II. Claims 7 and 8-10 drawn to a reactor with means for introducing gaseous reactants classified in Class 118, Subclass 49.5.
> III. Claims 21-29 which are drawn to a gaseous epitaxial coating process classified in Class 117, Subclass 106.

(Ex. 15 at 35, P 11.)

At paragraph 12 of Exhibit 15 at 35, the Examiner commented:

> The inventions as above grouped are separate and distinct because the *apparatus* of Group I and of Group II are physically different. That of Group I is essentially an oven and if used for gaseous coating

> would leave a limited supply of coating gas, while that of Group II is a reaction chamber of potentially unlimited reaction gas supply. The *process* of Group III is a distinct invention from the apparatus of Groups I and II which could be used for non-epitaxial deposition. (Emphasis in original.)

The '609 application constitutes a divisional application directed to the claims of Group III, and filed by Plaintiff on November 3, 1971. (Ex. 212 at 2.) Defendants claim that the '609 application is double patenting, not protected by the provisions of 35 U.S.C. § 121, and that it claims the same invention as did the '712 patent which was the elected application following the restriction requirement of the '473 Application, which has the effect of providing protection to the claims first protected by the '712 patent, then by the '609 patent for a total period of 31 years. Defendants further contend that Plaintiff is not protected by the provisions of § 121 because in prosecuting the '609 application Plaintiff did not abide by the Examiner's restriction requirement and crossed the line of demarcation between the independent and distinct inventions identified in the restriction requirement.

The dispute on this point is as to the divisional meaning of the line of demarcation. Defendants contend that the line was drawn between epitaxial deposition specifically and chemical vapor deposition generally; Plaintiff contends that the line of demarcation is between the Examiner's actual grouping as reflected in the classifications to which each group was assigned in Exhibit 15, p. 35, P 11.

Expert opinion was elicited by Plaintiff from Mr. Zimmerman and by Defendants from Mr. Carney on these points.

The conflict between the parties and experts boils down to the question of whether the line is delineated by the Examiner's division in paragraph 11 of the Restriction Requirement Work Sheet, (Ex. 15 at 35), or by the Examiner's Statement of Reasons in paragraph 12 of that worksheet.

Defendants' view is that the contents of paragraph 11 rely upon classification only as a basis for the exercise of discretion to impose a restriction requirement, not as a basis for establishing the line of demarcation.

The issues to be resolved are whether the divisions between inventions effected by the line of demarcation and its attendant consonance requirement are controlled by the actual claim groupings made by the Examiner, or by the Examiner's subsequent explanatory comments. In this case the Examiner's groupings, cited ante, are set forth in paragraph 11 at page 35 of Exhibit 15, which is entitled "Telephone, Restriction and Transfer Work Sheet." The Examiner's comments are set out in paragraph 12 of that same exhibit, and paragraph 13 contains the Examiner's decision to require a restriction for examination purposes. These same paragraphs are set out in the Office Action commencing at page 37 of Exhibit 15.

Mr. Zimmerman testified that the line of demarcation is determined by Patent Office classification, (XXIX RT 3490:24-3491:3), and that the law maintaining consonance is using the classification system that the Patent Office has

imposed, and not what the Examiner says the classifications consist of. (XXIX RT 3496:21-3497:3.)

Mr. Carney testified that in forming his opinion concerning the line of demarcation, or whether claims were consonant with it, he did not consider the particular classification into which the Examiner placed the groupings of claims. (XVI RT 1674:22-1675:1.) Mr. Carney's delineation of the line of demarcation is between the epitaxial deposition claimed in Group III and the epitaxial and like deposition claimed in Groups I and II. His opinion is that when the claims constituting Group III were amended to include epitaxial and like deposition the line of consonance was impermissibly crossed and Section 121 protection from allegations of obviousness was lost. (XV RT 1564:9-1570:16.)

In addition to Mr. Carney's testimony Defendants rely also on their interpretation of 35 U.S.C. § 121 and cited portions of the Manual of Patent Examining Procedure (M.P.E.P.), (Exhibit 975), as set forth in pages 45-48 of Defendants' Corrected Post-Trial Brief and at pages 37-40 of Defendants' Post-Trial Reply Memorandum. Defendants contend that the controlling section of the M.P.E.P. for the determination of whether two or more related inventions are distinct is § 806.05. The specifically pertinent subdivision of that section is said to be § 806.05(e) which concerns the relationship between inventions which constitute "A process and apparatus for its practice." Defendants claim that applying that section leads to a finding in this case that "The process as claimed can be practiced by another materially different process or by hand," § 806.05(e)(1), thus rendering the inventions distinct; the basis of distinction being not that one is a

process and one an apparatus but that the process of one can only be practiced by epitaxial deposition, while the distinguished inventions can practice both epitaxial deposition as well as other chemical vapor depositions. Thus, say Defendants, when Plaintiff amended to claim both epitaxial and non-epitaxial chemical vapor deposition, the distinction between inventions was destroyed, and consonance transgressed. This is apparently the view of Mr. Carney, and, if accepted, a lack of consonance might be indicated by the amendment. Interestingly, Mr. Johnston, one of Defendants' experts, opined that as amended and issued the '609 patent is directed to epitaxial deposition and not chemical vapor deposition generally. (XXVII RT 3090:11-21.)

The view expressed by Mr. Zimmerman appears to be supported in applicable case law. *See Texas Instruments v. United States International Trade Commission*, 988 F.2d 1165, 1179 (Fed. Cir. 1993); *Studiengesellschaft Kohle mbH v. Northern Petrochemical Company*, 784 F.2d 351, 355 (Fed. Cir. 1986). Since double patenting is an affirmative defense, Defendants must prove it by clear and convincing evidence. *Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1580 (Fed. Circ. 1991). Defendants have not done so. Accordingly, the '609 patent is not invalid for double patenting, is entitled to the protection of 35 U.S.C. at 121 and is not obvious over the '712 and '469 patents.

2. Obvious Over the Prior Art.

Defendants have not proven by clear and convincing evidence that the claims of the '609 patent are obvious over the prior art.

The '609 patent, (Ex. 10), was examined and issued by the United States Patent and Trademark Office and is presumed to be valid under 35 U.S.C. § 282. That statute places the burden of proving facts compelling a conclusion of invalidity on the party asserting invalidity, *SmithKline Diagnostics, Inc. v. Helena Laboratories Corp.*, 859 F.2d 878 (Fed. Cir. 1988), and in order to compel a conclusion of invalidity that burden must be carried by clear and convincing evidence. *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082 (Fed. Cir. 1985), opinion on remand, 810 F.2d 1561 (Fed. Cir. 1987), *cert. denied*, 481 U.S. 1052 (1987).

The scope and content of the prior art includes U.S. Patent Numbers 2,692,839 to Christensen, et al.; 3,364,087 to Solomon; 3,382,100 to Feldman; 3,408,982 to Capita; 3,460,510 to Currin; 3,619,283 to Carpenter; 3,627,590 to Mammel; 3,637,434 to Nakanama; 3,660,180 to Wajda; 3,692,572 to Strehlow; 3,424,629 to Ernst; British Patent No. 1,124,328, (Ex. 564), to Siemens; Powell, C.F., Vapor Deposition, pp. 263-267, John Wiley and Sons, Inc., New York, N.Y. (1966); Nichols, "The Use of Close Spacing in Chemical-Transport Systems for Growing Epitaxial Layers of Semiconductors, Journal of Electro Chemical Society, Vol. 10, No. 11, 1963, pp. 1165-1167; Williams and Jackson article, (Ex. 590); publications of Dyer, Huff and Seki, (Exs. 584, 579, 581.)

The Merck reactor and the Mammel reactor are not relevant or material prior art to the '609 patent. (XXVI RT 3012:1-9; XXIV-A RT 2541:15; Order of November 4, 1993.)

In supporting its case that the '609 patent is obvious over the patent to Capita in view of the publication by Powell, Defendants list two relevant prior art references, U.S. Patent No. 3,408,982 to Capita, (Ex. 810), and the 1966 publication of Powell, (Ex. 577). I approach this issue from the perspective of what would have been obvious to one of ordinary skill in the art at the relevant time, observant of the presumption that such a person is not the extraordinarily innovative person nor a researcher of inexhaustible patience, *Cf. Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448 (Fed. Cir. 1985), but is a person who has available all prior art and all disclosures, but thinks along conventional lines in matters affecting the art in which he or she is skilled. Having this in mind, it is noted that, in the opinion of Professor Oldham, Powell teaches a heating method as the beginning point for the design of the reactor, upon which the design is predicated. The substitution of a different heating source after the completion of the design is inconsistent with that methodology, (Oldham testimony, XXVIII RT 3241:22-3242:18). Powell advocates substitution of a radiant heat source for an RF source only in an effort to eliminate the need for a susceptor, and not to provide an alternate heat source for purpose of design.

Defendants contend that the patent to Capita contains every element of the claims of the '609 patent except the heat source. Therefore, the reference to radiant heat as a source contained in Powell would motivate one skilled in the art to make that obvious substitution, thus ending up with a combination containing all the elements of the '609 claims. (Johnston testimony, XXIV-A RT 2500A:2-2501A:19.) Mr. Johnston referred also to the patent to Carter, (Ex. 563), showing a plurality of lamps uniformly

spaced apart in a plane, which are said to be fit for semiconductor work, including "crystal growth," (XXIV-A RT 2501A:20-2503A:19). However, Mr. Peltzer in XXII RT 2260:7-16 testified that Carter in using the term "crystal growth" was most likely referring to crystal pulling and not to chemical vapor deposition.

Because of the contentions of Defendants just outlined, it is necessary to determine against the background of the thinking in the art then applicable whether Defendants have proven by clear and convincing evidence that it would be obvious to make the heat source substitution, and whether Powell would motivate one skilled in the art to make the substitution.

On the issue of motivation it is noted that Powell did not suggest substituting lamps for RF heating in any of the five cases where he stated that RF was suitable, (Peltzer testimony, XXII RT 2258:16-22), and that the use of RF heating was the state of the art in 1966 when the Powell publication was written, (Peltzer testimony, XXII RT 2258:2-7). Powell expressly suggests the use of lamps as a radiant heat source only for small scale, low temperature applications. Professor Oldham was of the opinion that nothing in Powell contemplated substitution of heat sources at all. (XXVIII RT 3241:22-3242:7.)

At pages 265 and 266 of his publication, (Ex. 577), Powell states:

> Heating with infrared radiation has been used in small-scale applications where intense heating of the container walls through this type of heating may not be so effective in this respect as induction heating.

> For the low to medium temperature range, up to 1000 or 1200 degrees C the application of unconcentrated radiation from a heat lamp or, better, from one or more of the newer "sun guns" used in cinc-photography is effective. Such equipment is inexpensive, requires a minimum of auxiliary equipment, and can be set up readily. The more recently developed tubular quartz-tungsten-iodine lamps provide a more compact source of radiation having somewhat higher power outputs.

I conclude that Defendants have not sustained their burden of proving by clear and convincing evidence that one skilled in the art of chemical vapor deposition would have been motivated to combine Capita with Powell.

The portions of the Powell publication which are in evidence, (Ex. 577), do not disclose or suggest the use of radiant lamps with a susceptor. The teaching of the Powell reference is that RF heating is preferred for the design of CVD reactors. (Ex. 577, pp. 263, 264.) RF heating was the state of the art for coating processes in 1966. (Peltzer testimony, XXII RT 2258:2-7.)

There is no clear and convincing evidence that the '609 patent is obvious over Capita in view of Powell. Defendants rely on a holding of the Court of Custom and Patent Appeals in 1980, (Ex. 214 at 160), that a method of using radiant lamps to heat wafers on an opaque susceptor within a quartz enclosure for the purpose of chemical vapor deposition is obvious over Capita in view of Powell, that Powell teaches one skilled in the art to substitute radiant lamp heating for the RF induction coil heating of Capita for CVD. The method claims before the C.C.P.A. are alleged

to have covered the same essential components as are required by the '609 patent.

On August 29, 1975, Plaintiff filed a continuation application under Serial Number 608,878. The application was a continuation of prior application Serial Number 310,444 which was abandoned. The application is claimed to be a division of Serial Number 866,473, October 15, 1969, Patent No. 3,623,712. The file wrapper, (Ex. 214), reveals an appeal from a final rejection of claims 1-11 and 24-35 as unpatentable over Powell in view of Capita. The PTO Board of Appeals upheld the Examiner's final rejection, (Ex. 214 at 132), and, after a request for reconsideration was denied, appeal was taken to the C.C.P.A. That court affirmed the holding of the PTO Board of Appeals, stating:

> In the light of the Powell discussion concerning the employment of various types of heat sources ... it would have been prima facie obvious [to one of ordinary skill in the pertinent art] to employ radiant heat and an appropriate type of susceptor in place of the inductive heat and susceptor employed by Capita.

On the issue of motivation the court said:

> However, Powell discloses several advantages of radiation heating: (1) inexpensive, (2) avoids intense heat on the container walls, (3) requires minimum of auxiliary equipment, (4) can be set up readily, (5) heats nonconducive as well as conducive substrates, and (6) avoids obscuring the container walls where no deposition reaction occurs at low to medium temperatures.

The problem presented by the existence of this C.C.P.A. opinion, which is well reasoned and rendered by a court in the exercise of its unchallenged jurisdiction, is that, notwithstanding the C.C.P.A. holding, the '609 patent did issue and is presumed to be valid. "The presumption of validity carries with it the assumption that the evidence considered by the PTO when granting the patent was material." *Applied Materials, Inc. v. Gemini Research Corp.*, 835 F.2d 279, 281 (Fed. Cir. 1987). If the Examiner considered evidence adduced after the rendition and filing of the C.C.P.A. opinion, there must be a conclusive showing that such evidence was immaterial in order to give the C.C.P.A. opinion and judgment estoppel effect in this proceeding. *Id.*

Defendants have not carried the burden of proving by clear and convincing evidence that the record before the Examiner at the time the patent issued was not material. Defendants suggest that the allowance of the patent was granted because the Examiner was "worn down," or because the allowing Examiner was not aware of the C.C.P.A. decision, or because the allowing Examiner did not want to respond to another onerous appeal. This speculation, while interesting, is not helpful.

My holding differs from a very clear holding by the predecessor court to the Federal Circuit, the jurisdiction of which to review decisions of the Board of Patent Appeals has been inherited by the Federal Circuit. In the words of Professor Chisum:

> Hence it can be expected that the Federal Circuit will follow and develop the prior C.C.P.A. case law defining that jurisdiction.

I see the problem as involving the impact of the presumption of validity in light of the C.C.P.A. holding. I resolve the matter in favor of the patentee.

> A person of ordinary skill in the art of designing and developing CVD and epitaxial reactors and processes for producing commercial quality epitaxially coated silicon wafers and other like CVD products during the period of about 1967 through 1972, would be a person who would have a Baccalaureate of Science or Masters of Science degree in physics, electrical engineering, or chemical engineering followed by experience in the field (two years and more).
> That period should -- that experience should include:
> One, actual operation of reactors to grow film.
> Two, experience in correcting problems such as haze, resistivity variations, and thickness uniformity variations.
> Three, experience in evaluating films, such as for resistivity, staining and interfer -- ferrometric thickness measurements, metallurgic etching to expose defects.
> And four, a practical understanding of the hazards of the work and safe operating procedures.
> Five, understanding the role of epitaxy in silicon semiconductor processes.
> Six, familiarity with semiconductor processing equipment such as flow meters, mass flow controllers, tubing technology and power sources.
> Seven, a knowledge of a specific engineering criteria, plumbing joints and valves, connections between the reactor and power supply, and power load calculations.
> Understanding the EPI process to properly interlock

the machine for safety and quality control purposes, and deposition technology to define the times and temperatures for operation.

(Peltzer testimony, XXII RT 2251:16-2252:20.)

The record contains substantial objective evidence of non-obviousness which I am required to weigh. *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573 [222 U.S.P.Q. 744] (Fed. Cir. 1984); *Custom Accessories, Inc. v. Jeffrey-Allan Industries*, 807 F.2d 955 (Fed. Cir. 1986).

Objective evidence of non-obviousness may include evidence of long felt but unsatisfied need which is satisfied by the invention in suit together with failure of others to fulfill the long-felt need; evidence of commercial success, which has been held to be dispositive on the issue of obviousness, *Simmons Fastener*, *supra*; evidence of copying of the invention; evidence of industry recognition of the value of the patent.

In this case Joseph A. Nava testified without objection as an expert witness on the subject of the need in the semiconductor industry in the 1960's for improved epitaxial reactors, (XXVI RT 2818:16-2819:16), and, over objection, as an expert in the commercial acceptance of Plaintiff's radiantly-heated reactors in the 1970's. He testified that in his opinion that there was a long-felt need in the semiconductor industry prior to 1968 for an epitaxial reactor that was superior in uniformity and safety, and produced higher yield of product. (XXVI RT 2819:17-2821:19.) He testified that while he was at RCA there was an effort to develop equipment for the epitaxial

process which was unsuccessful at the time he left RCA in 1963, (XXVI RT 2823:1-2824:1); while Nava worked at Signetics the company did not use epitaxial processes, and tried to develop an epitaxial reactor because their yield was insufficient under their triple diffusion process. Despite significant effort Signetics had been unable to develop an epitaxial production process when Nava left Signetics. (XXVI RT 2824:2-2827:6.) Nava further testified that when he worked at Westinghouse in 1965 that company was dissatisfied with its manufacturing process and the yield thereof, and particularly with the uniformity of epitaxial layers. Westinghouse needed a better epitaxial process and a better epitaxial apparatus. (XXVI RT 2827:7-19.)

Following his Westinghouse tenure Nava went to Raytheon where he worked on the development of epitaxial reactors. This work utilized a radio frequency heat source with a horizontal quartz tube and a graphite susceptor. These reactors produced a low yield, and there were problems with temperature control. (XXVI RT 2828:16-23.)

When Nava went to Applied Materials in 1968 he became familiar with the programs for equipment development conducted by large semiconductor companies including IBM, Texas Instruments, Motorola, AT&T and Fairchild. Each of those companies conducted ongoing development efforts in the field of epitaxial reactors. (XXVI RT 2828:24-2829:11.)

In 1970 Nava became Director of Marketing at Applied Materials and continued in that position until his resignation two years later. He returned to Applied

Materials as a sales executive between 1976 and 1980. (XXVI RT 2832:18-2833:13.) Salesmen who reported to Nava were required to write reports on their "field calls" on customers, reporting customer needs and what needed to be done in order to effect sales. (XXVI RT 2837:18-2838:24.) Nava had other sources of industry information such as conversations with consultants, with academicians and with competitors. (XXVI RT 2839:3-17.)

Nava opined that a substantial part of Plaintiff's commercial success was its introduction of epitaxial reactors, which was its main product, together with its use of radiant lamps quartz enclosure and susceptor for epitaxial deposition which improved temperature uniformity which in turn produced the uniformity of layers on the wafers. (XXVI RT 2848:15-2849:6.)

Nava observed industry skepticism of Plaintiff's epitaxial reactor product in 1971-1972. (XXVI RT 2849:14-21.) From conversations with Plaintiff's customers it became clear to Nava that Plaintiff's radiant-heated barrel reactor produced greater temperature uniformity than did radio frequency generator-type reactors found elsewhere in the market. (XXVI RT 2854:8-2855:1.)

During Nava's first period of employment with Applied Materials only one radiantly-heated barrel reactor was sold. For the next several years Mr. Nava worked in an unrelated industry, and during his second period of employment, in the late 1970's, the majority of his contact with companies in the semiconductor industry was with Motorola. (XXVI RT 2873:1-22.)

Nava testified that in the late 1970's Applied Materials was the most significant vendor of epitaxial reactors in the semiconductor industry. (XXVI RT 2874:7-13.)

Motorola continued to use RF heated reactors through the mid-1970's to process epitaxial wafers. (XXVI RT 2875:18-24.) Mr. Nava's opinion was based on his total experience in the industry and not solely on his experience with any one company such as Motorola. (XXVI RT 2880:25-2881:7; 2882:17-2884:2.)

James Haxton was qualified over objection as an expert witness on the subject of market acceptance and reaction to Applied Materials' radiantly-heated epitaxial reactors. (XXVI RT 2898-2899:6.)

Haxton was of the opinion that there was industry skepticism of Plaintiff's radiantly-heated reactors. National Semiconductor, a customer of Plaintiff for other types of equipment, viewed the radiant-heat reactor initially as an R&D tool that might never make it in production. (XXVI RT 2899:15-2900:15.) Another customer, Advanced Micro Devices, was very skeptical of the new radiant heat reactor and did not purchase one for a substantial period of time. (XXVI RT 2901:4-25.) Don Jackson of Motorola originally referred to Plaintiff's radiant heated reactor as an unneeded R&D toy, and Motorola did not purchase one until after the mid-1970's. (XXVI RT 2902:1-23.) Plaintiff's reactor was a dramatic departure from previous industry standards, and persons in the industry were concerned over many technical problems such as ability to keep the lamps lit, keeping the

quartz bell jar clean, and as to whether the reactor would function in a production environment. (XXVI RT 2903:23-2904:17.)

Once the yield possible by use of Plaintiff's radiant heated reactor became known, the reactor was well received in the market. (XXVI RT 2904:19-2907:9; 2910:8-2912:16.) Once manufacturers commenced using Plaintiff's barrel reactor, Plaintiff's competition encountered strong resistance in their efforts to sell competing systems. (XXVI RT 2919:7-2920:25; 2922:20-2923:22.)

Mr. Haxton testified as to the award Dr. Benzing, co-inventor of the McNeilly-Benzing patents in suit, received the SEMI award given at the banquet at the meeting of SEMICON, the organization made up of members of the semiconductor industry. (XXVI RT 2926:2-23.) Haxton's opinion on the issue of industry recognition was based on the award to Benzing in 1979 and

> The overall feeling in the industry at the time which -- which you get just from being in the business as long as I have ... It's still a small community. You attend conferences, you go to SEMICON shows, you talk to people ... you don't have to talk to too many people and you realize where they're coming from ... They know what's going on, what's best for them, and ... included in that timeframe, Applied produced the best EPI wafers.

(XXVI RT 2928:1-12; 2945:20-2946:15.)

Mr. Watson testified that Plaintiff in 1969 was producing equipment for companies with an interest in "epitaxial silicon," which was "first in the industry, in a sense." (XVIII RT 1790:9-1791:4.) Mr. Watson describes Dr. Benzing as well respected in the industry because of his wealth of experience in the field of CVD and his innovative design ideas. (XVIII RT 1801:4-11.)

The AMC-740 was sold by Plaintiff to Texas Instruments on November 22, 1971. (Ex. 881; XVIII RT 1825:24-1830:12.)

Mr. Watson testified that when the concept of using lamp heating for chemical vapor deposition was first presented to Texas Instruments in form of the Nitrox reactor was novel and the idea that everything was contained in one piece of equipment was attractive to the customer. (XVIII RT 1845:14-1846:22.) Customers of Plaintiff expressed to Mr. Watson that they were purchasing lamp heated barrel resistors because of improved performance due to temperature uniformity. (XVIII RT 1848:15-25.)

In the early 1970's Plaintiff encountered resistance to the sale of its reactors to companies which manufactured their own reactors in house. (XVIII RT 1849:22-25.) Watson testified that plaintiff was a leader in the industry in 1976 because the total number of reactors manufactured by Plaintiff was the largest of any independent company in the market. (XVIII RT 1852:8-16.) When Watson first began selling the barrel reactor to Texas Instruments in 1971 Plaintiff's position in the market was dominant. (XVIII RT 1852:24-1853:5.)

William C. O'Mara, Ph.D., is a technical marketing research specialist who has conducted market studies involving the epitaxial reactor market. (XXVII RT 3138:8-16.) He testified without objection as an expert on the market for epitaxial reactors. (XXVII RT 3141:10-15.)

Commercial success of Plaintiff's radiantly-heated barrel reactor was established by the perception in the industry that Plaintiff's reactor was superior in temperature uniformity. This opinion received substantial support in the literature. (Exs. 190, 191, 192, 195.) The conclusion is also supported by Dr. O'Mara's market reports. (Exs. 180, 181, 182, 184, 185; XXVII RT 3150:24-3157:9.) Each of the foregoing exhibits are admissible in evidence, and are admitted.

Dr. O'Mara stated that Plaintiff was the dominant supplier of epitaxial reactors to the market throughout the 1970's. (XXVII RT 3180:9-19.)

I conclude that there is uncontradicted evidence of non-obviousness with respect to the commercial success of Plaintiff's radiantly-heated reactor, *Simmons Fastener*, *supra*, 739 F.2d 1573, [222 U.S.P.Q. 744] the long-felt need for temperature uniformity and the failure of others in the field to accomplish that need, *Panduit*, *supra*, 774 F.2d 1082. Secondarily, there is also uncontradicted evidence of industry recognition including that of an award to the co-inventor Benzing. *Corning Glass Works v. Sumimoto Elec. U.S.A., Inc.*, 671 F. Supp. 1369 [5 U.S.P.Q.2d 1545] (S.D.N.Y. 1987), *aff'd*, 868 F.2d 1251 [9 U.S.P.Q.2d 1962] (Fed. Cir. 1989).

Therefore I find that the '609 patent is valid and non-obvious.

3. Anticipated by Siemens.

Defendants contend that the '609 patent was anticipated by the British patent to Siemens. (Ex. 564.)

In order for an invention to be anticipated, the same device, including all claim limitations, must be shown to exist in a single prior art reference in which every element of the claimed invention is literally present, arranged as in the claim. *Richardson v. Suzuki Motor Co., Ltd.*, 868 F.2d 1226 (Fed. Cir. 1955), *cert. denied*, 475 U.S. 1017 (1986).

Every requirement of the '609 claims is not met by Siemens. Claim 3 of the '609 patent claims:

> 3. The process of Claim 1 wherein the radiant heat energy is provided by a high intensity tungsten filament lamp.

(Ex. 10, column 12:46-48).

There is no evidence that the tungsten filament lamp specified in Claim 3 of the '609 patent is the literal equivalent of any means of heat set forth in Siemens.

In the course of the prosecution of the '609 application, Plaintiff distinguished resistance heaters in the prior art from the '609 patent on the ground that the latter is restricted to lamp heating, and is a cool wall reactor. (Ex. 214, p. 57, P 16; Johnston testimony, XXV RT 2762:2-2763:8; XXII RT 2230:13-22.)

Furthermore, Siemens does not disclose the relative size and position of the susceptor as a precise literal equivalent of the '609 claims.

Finally, Siemens was cited as a reference in the '609 prosecution and was before the Examiner for consideration when the '609 patent issued.

Defendants have not shown by clear and convincing evidence that the '609 invention was anticipated by Siemens.

B.
'313 PATENT

1. 35 U.S.C. § 102.(b) On-Sale Bar.

Defendants have the burden of proving invalidity by clear and convincing evidence. *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570 (Fed. Cir. 1985).

If the '313 patent is entitled to the 1969 filing date because it is enabled by the 1969 application, then there is no on-sale bar occasioned by the 1971 sale of the AMC-740 reactor by Plaintiff.

Defendant contends that the practice of the '313 patent invention is not enabled by the 1969 application. Mr. McNeilly testified that the '313 patent was intended to address the slip induced by back-side heating. (McNeilly testimony, IV RT 428:5-19.)

The '313 patent specification identifies "indirect heating" as the problem addressed by the invention. (Ex. 5, Col. 2:32-55; XXVI RT 2955:25-2926:12.)

Mr. Johnston, testifying as a defense expert, stated that the '313 specification presents same side heating as an alternative to other techniques, including that of controlling the ramping speed. (XXVI RT 2955:7-19.)

One of ordinary skill in the art employing information readily available, *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931 (Fed. Cir. 1990), *cert. denied*, 498 U.S. 920 (1990), together with the specification of the 1969 application is sufficiently enabled to practice the '313 patent, and the '313 patent is therefore entitled to the filing date of the 1969 application.

Basics of operating epitaxial reactors such as slip from a fast ramp are not claimed by the '313 patent because it was well known in the art. (XXVIII RT 3248:5-3249:5.)

The sale of the AMC-740 reactor having occurred in 1971, a date subsequent to the filing date of the '313 patent, the latter is not invalid by reason of the on-sale bar of 35 U.S.C. § 102(b).

This same issue was the subject of cross motions for summary judgment in a case filed in this district entitled *Applied Materials, Inc. v. Gemini Research Corporation*, C-89-2303-CAL. In that case Plaintiff Applied Materials, Inc. was granted summary judgment on the ground that the '712 patent (the parent patent) explicitly or inherently described the device covered by the '313 patent. The '313

patent was therefore entitled to the 1969 filing date of the parent application and the "on sale" defense based on a 1971 sale failed. (Ex. 296.)

Defendants contended that the record in the Gemini summary judgment motions was quite different: that Gemini did not raise the issue of inherency because it had previously in another motion argued that the Figure 6 reactor enabled the practice of the '313 patent and could not abandon that position; that the court in the summary judgment motions did not have the benefit of the testimony of Dr. Benzing or of Mr. Peltzer; and that plaintiff had made inconsistent admissions before the British Patent Office.

I conclude that the '313 patent is inherently enabled by the parent application of 1969.

The '313 patent only claims a particular way to reduce slip; "same side" lamp heating. (Johnston testimony, XXVII RT 3058:17-19; McNeilly testimony, IV RT 428:11-19; Oldham testimony, XXVIII RT 3246:22-24.)

Figure 6 of the 1969 application shows "same side" lamp heating. Figure 6 of the '313 patent and Figure 6 of the 1969 application which was filed in 1969 and which led to the issuance of the '712 patent and other patents each show "same side" lamp heating, and the use of the reactor shown in Figure 6 of the 1969 application would inherently practice the method claim of Claim 1 of the '313 patent, (XXVIII RT 3246:22-18), but such practice would not guarantee freedom from slip from all causes. (Oldham testimony, XXVIII RT 3247:25-3248:4.)

In his deposition taken on January 29 and 30, 1985, in the Gemini case, Dr. Benzing testified at pages 66 and 67 concerning the operation of the reactor depicted in Figure 6 and the importance of having the substrate and the susceptor heat at approximately the same rate. (Depo. 66:18-67:25.) Dr. Benzing was questioned as to whether operation of the Figure 6 reactor in accordance with the disclosure of the 1969 application leading to the issuance of the '712 patent would produce a product free of crystallographic strip. He answered that "You can," (11. 21,22), or "you may not," (1. 25). Those answers to a question contemplating freedom from slip from whatever cause can scarcely contemplate something in the nature of an admission that the 1969 application Figure 6 did not enable the invention of the '313 patent, as Defendants argue.

The testimony is clear that there can be several sources of slip, including a lack of concern over slip on the part of the one operating the reactor. (XIX RT 1944:2-1946:15.)

There is no evidence that, if operated by one skilled in the art to whom elimination of slip was an important consideration, the Figure 6 reactor would not eliminate the slip caused by back side heating.

2. Best Mode.

There are two steps to a best mode analysis, *Chemcast Corp. v. Arco Industries Corp.*, 913 F.2d 923 (Fed. Cir. 1990): First, whether at the time of filing the patent application the inventor knew of a mode for the practicing of the invention that the inventor considered to be better than any other, a wholly subjective inquiry.

Second, if there was such a mode preferred by the inventor, was it disclosed in such a manner as to enable one skilled in the art to practice the preferred mode, or did the inventor "conceal" the best mode? This is largely an objective inquiry which depends upon the scope of the claimed invention and the level of skill in the art.

Plaintiff claims that in view of the entitlement of the '313 patent to the 1969 filing date of the parent application it is required to disclose the best mode as of 1969, and not as of 1972, the year in which the Continuation in Part Application was filed.

Defendants, relying upon *Transco Products, Inc. v. Performance Contracting, Inc.*, 821 F. Supp. 537 (N.D. Ill. 1993), contend that even if the '313 patent was entitled to the 1969 date, and even though the '313 claims are supported by the 1969 parent application, Plaintiff was nonetheless obligated to disclose the best mode known to the inventors McNeilly and Benzing as of the date of the filing of the Continuation in Part Application.

Transco Products, Inc. holds that if an inventor files a continuation application it serves the ends of both 35 U.S.C. §§ 112, 120 to require the inventor to disclose any best mode information not known at the time of filing the original application but learned before the filing of the Continuation In Part Application. *Transco Products, Inc.*, *supra*, 821 F. Supp. at 550. This holding does not impose an independent requirement to update by disclosing each new piece of information, in the absence of the filing of a Continuation In Part Application, so that absent such a filing an inventor continues to have the benefit of the earlier filing date.

Professor Chisum agrees that

> [A] preferred or superior mode of carrying out the invention developed or discovered after the filing of the application need not be added to the specification by amendment or otherwise.

D. Chisum, Patents § 7.05[2].

Professor Chisum appears to be of the view that where a Continuation Application is filed it must conform to § 112 which requires disclosure of the best mode of practicing the invention as of the date the Continuation Application is filed:

> The filing of a continuation application is a significant event that should sufficiently alert the applicant of the obligation to determine whether the best known mode of carrying out the invention is disclosed in the specification.

Id. § 7.05[2].

In *Johns-Manville Corp. v. Guardian Industries Corp.*, 221 U.S.P.Q. 319 (E.D. Mich. 1983), *aff'd*, 770 F.2d 178 (Fed. Cir. 1985), plaintiff filed Continuation In Part Applications after filing a parent application which was subsequently abandoned. The court held that plaintiff, having met the requirements of 35 U.S.C. § 120, was entitled to the earlier filing date of the parent application for best mode analysis purposes, and that plaintiff's obligation to disclose the best mode was satisfied by the disclosures of the parent application. 221 U.S.P.Q. at 345.

If the Continuation In Part Application discloses refinements to the invention which were not disclosed in the parent application and which are related to amendments in the Continuation In Part Application which were not present in the parent application and which are essential to the successful practice of the invention, such refinements constitute best mode and must be disclosed in the Continuation In Part Application. *Id.* In other words, if the disclosure and specifications of the parent application are not changed during the Continuation In Part Application, there is no need to disclose other refinements as best mode. The court found it to be a significant factor that plaintiffs were not aware that a refinement disclosed after the filing of the parent application comprised the best mode of the practice of the invention disclosed in the parent application.

Professor Chisum characterizes the holding of the Johns-Manville court as representing a compromise view. D. Chisum, Patents § 7.05[2] n.3.1.

It follows that resolution of the best mode issue in the instant case requires an inquiry as to whether the Continuation In Part Application contained the disclosures of material essential to successfully practice the invention and which significantly amended the disclosure of the parent in a fashion known to the inventors to constitute best mode for the practice of the invention. That disclosure is alleged by Defendants to be Plaintiff's AMC-740 reactor.

The '313 application set forth the embodiment shown in Figure 6 which was identically the same as Figure 6 of the parent application. The '313 application did not disclose the embodiment comprising the AMC-740 reactor. Mr. McNeilly testified that the prototype of the Figure 6

configuration was not known to the inventors to produce slip free epitaxial deposition, (IV RT 384:16-385:7), and that it was the 740 configuration which gave the slip free results ultimately claimed in the '313 patent. *Id.* at 385:12. McNeilly preferred the susceptor configuration of the AMC-740 to that illustrated in Figure 6 which the inventors did not have the capability to make the Figure 6 susceptor in the size depicted at that time. *Id.* at 385:17-386:4.

The embodiments set forth in Figures 8 and 9 of the '313 application were never sold commercially. McNeilly preferred the AMC-740 embodiment to both those of Figure 8 and of Figure 9. *Id.* at 387:11-389:5.

On June 27, 1972, Dr. Benzing filed an Invention Disclosure Form, (Ex. 714), for an invention which he described as "an apparatus and method for preparation of epitaxial silicon wafers with minimal crystallographic slip." In describing the "Details Of Preferred Embodiment Of Invention" on that form, Dr. Benzing wrote in pertinent part:

> The method of preparation of epitaxial silicon wafers with little or no crystallographic slip utilized direct radiant heating of the silicon wafer. In work to date this was accomplished in a radiantly heated reactor of cylindrical construction in our U.S. Patent No. 3,623,712, Fig. 6 ... Although the present work was done with a cylindrically shaped reactor, the same principles apply to directly heated reactors of horizontally aligned configuration such as a horizontal tube type provided the radiant lamps are arranged above the wafers which would be resting on a horizontal support member (susceptor). The lamps

> would be heating the wafers directly to minimize thermal gradients.

(Ex. 714, pp. 4188, 4189.)

Included in Exhibit 714 is a memorandum describing an experiment in which the AMC-740 was compared with two other reactors, AMV-800 and AMH-620, to determine the degree of slip free performance between the reactors.

It was concluded that the AMC-740 produces significantly less slip than either of the other reactors. Dr. Benzing received a copy of that memorandum, (Ex. 714, pp. 4200-4205.)

Mr. McNeilly testified that he had reasons to believe the prototype barrel reactor built in accordance with Figure 6 produced slip free wafers within the meaning of the '313 patent because:

> A. It was the ... the configuration is essentially the same as the barrel configuration of the product in that the heat source is external to the walls and directly ... it directed to ... on the wafer surface.
> Q. And is that referred generally as same-side heating, lamp heating?
> A. Same side heating which has a susceptor behind the wafer, yes.

(IV RT 427:20-428:2.)

I am satisfied from the clear and convincing evidence that Mr. McNeilly and Dr. Benzing knew that the configuration of the embodiment of the AMC-740

constituted the preferred embodiment of the '313 invention. It is clear from Mr. McNeilly's testimony that they never conducted an investigation of the Figure 6 prototype to determine its slip free attributes. I think that both inventors preferred the AMC-740 over all other reactors.

Nowhere does the Continuation In Part Application disclose or refer to the AMC-740 or its attributes. All of the features of the AMC-740, whether they contributed to slip free performance or not, should have been disclosed. *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 954 (1987).

The '313 patent is invalid for failure to disclose the preferred mode as required by 35 U.S.C. § 112. Because I find the patent to be invalid on this ground there is no need to discuss the charge of obviousness. I have considered the parties' letters of November 1, 1993, and November 3, 1993, respectively.

INFRINGEMENT

Exhibit 913 entitled "Non-Infringement Bases Common to Several McNeilly Patents" sets forth claim requirements which Defendants contend are not infringed by the Epsilon One reactor. Defendants also contend that Epsilon One does not infringe the Logar patent.

According to Exhibit 913, the plurality of substrates limitation is applicable to the '496 patent; the large susceptor with thermal flywheel effect is applicable to the '712, '496 and '609 patents; the uniform radiant energy

field is applicable to the '496 patent and the cool wall reactor with no film deposits is applicable to the '712 and '496 patents.

A.
SIMULTANEOUS PROCESSING OF WAFERS- '496 PATENT

Plaintiff's expert, Mr. Zimmerman, testified that claims of the '496 patent are not limited to "batch" processing, but also cover the serial heating of discrete substrates one at a time. (VIII RT 835:9-15.)

Mr. Zimmerman testified that as a general rule of claims construction the singular covers the plural, but the plural does not cover the singular. (IX RT 867:13-20.) Exhibit 210 at 57 indicates that on August 31, 1973, Plaintiff filed an Amendment Prior to First Office Action, which included at page 39 of Exhibit 211 a rewriting of Claim 11 in which the word "substrates" is substituted for "substrate." The Amendment contains no commentary or explanatory language concerning that change.

Mr. Zimmerman concluded that the Amendment was intended to buttress the applicant's position with respect to the unfocused heat aspect and not as a limitation on the numerosity of wafers, but that if the Amendment is seen as precluding literal infringement the patent is nonetheless infringed under the doctrine of equivalents. (VIII RT 842:1-844:2.)

Plaintiff has the burden of proof by a preponderance of the evidence of the issue of infringement under the doctrine of equivalents. *Under Sea Industries, Inc. v.*

Dacor Corporation, 833 F.2d 1551 [4 U.S.P.Q.2d 1772] (Fed. Cir. 1987).

The doctrine applies if the alleged infringer's device performs substantially the same function of the patented device, in substantially the same way to obtain the same result. *Graver Tank & Mfg. Co., Inc. v. Linde Air Products Co.*, 339 U.S. 605 [85 U.S.P.Q. 328] (1950). There is infringement if each claim limitation is met either literally or by a substantial equivalent. *Read Corp. v. Portec, Inc.*, 970 F.2d 816 [23 U.S.P.Q.2d 1426] (Fed. Cir. 1992). The doctrine of equivalents is an equitable doctrine, *Valmont Industries, Inc. v. Reinke Mfg. Co., Inc.*, 983 F.2d 1039 (Fed. Cir. 1993), and is carefully confined to its equitable role. *Charles Greiner & Co. v. Mari-Med Mfg.*, 962 F.2d 1031 [22 U.S.P.Q.2d 1596] (Fed. Cir. 1992). Application of the doctrine is the exception and not the rule. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534 [20 U.S.P.Q.2d 1456] (Fed. Cir. 1991).

In the '496 patent analysis the question is whether serial loading is a substantial equivalent of batch loading. Plaintiff argues that the court must make this determination based upon the overall way in which the inventions operate, which, says Plaintiff, means the method of heating the wafers which includes, according to Plaintiff, the same type lamps and susceptor.

Mr. Peltzer, Defendants' technical expert, described the primary pervading characteristic of Epsilon One as its being a single wafer reactor, which processes one wafer at a time and deposits epitaxial layers on one wafer at a time. (XII RT 1250:2-8.) In addition, Epsilon One has a small susceptor, one that is approximately the same size as the

substrate in lateral extent; Epsilon One's susceptor is a small mass susceptor; Epsilon One uses non-uniform radiant heating, and where edge losses are significant, it supplies enhanced radiant energy by increasing the power of lamps. (XII 1262:12-1265:12.) Other characteristics are that the susceptor rotates and "spins" the wafer, which aids in diminishing the depletion of the dopants which would otherwise occur, owing to deposits on the walls of the reactor. (XIII RT 1297:11-22.)

Mr. Peltzer testified that Epsilon One, a single wafer reactor with the facility of rapid functioning and mechanical placement of wafers, achieves the same result, the commercial production of wafers as does a batch reactor but does not achieve that result in substantially the same way as a batch reactor, because it heats a single wafer rather than a plurality of wafers at the same time as is claimed in the '496 patent, and it is designed in such a way so as to produce a number of wafers within a relatively short period of time. (XIII RT 1302:22-1303:11.)

Based upon the evidence, I conclude that Plaintiff has not sustained its burden of proof by a preponderance of the evidence that Defendants' accused device, Epsilon One, infringes Claim 1 of the '496 patent, because I find that Claim 1 purports to claim a plurality of "heated substrates" and not the single substrate as utilized in Epsilon One. There is neither literal infringement nor infringement under the doctrine of equivalents. With respect to the latter, I find that the accused device achieves a substantially similar result to that contemplated by the '496 patent in that the function of chemical vapor deposit in commercial quantity is the same, but that the function is exercised and the result achieved in a substantially different manner. The accused

Epsilon One achieves its result by a unique means of single wafer deposition, temperature level and etching which comprises a wholly different "way" of achieving wafer production.

I do not discuss file wrapper estoppel because I do not find infringement under the doctrine of equivalents, and also because I agree with Plaintiff and with the holding of *In Re Mahurkar Patent Litigation*, 28 U.S.P.Q.2d 1801 (N.D. Ill. 1993), that a distinction based upon a prior art reference which is later removed from consideration because of Section 131 treatment cannot form the basis of such an estoppel.

B.
UNIFORM FIELD OF RADIANT ENERGY - '496 PATENT

Claim 1A of the '496 patent claims:

> (A) Radiant heat source defined by a bank of a plurality of high intensity radiant heat lamps which together produce and transmit radiant heat energy of short wave length as a generally uniform non-focused radiant energy field.

Dr. Oldham testified that the "generally uniform non-focused radiant energy field" language was inserted to distinguish Mammel, (Ex. 560), which demonstrates very focused rays, (VI RT 632:3-16). He stated that the accused Epsilon One has

> Uniform radiant heating of the wafer and susceptor achieved by upper and lower arrays of tungsten

halogen lamps backed by gold-plated water-cooled reflectors

(Exhibit 223; VI RT 634:22-635:6), which is consistent with his understanding of the uniformity of the radiant heating in the Epsilon One.

Mr. Peltzer understands the terms "generally uniform" as used in the '496 patent to include a lamp heat source which fluctuates in a tolerable range of 10% or plus or minus 5%. (XVIII RT 1862:7-1863:6.) If plus or minus 5% were exceeded, Mr. Peltzer would regard the resulting heat as non-uniform. *Id.* The fluctuation is measured at the wafer on the face of the susceptor. (XVIII RT 1865:12-15.) Based upon observations and recording made during the actual operation of the Epsilon One, Mr. Peltzer is of the opinion that Epsilon One operates with a non-uniform energy flux, and the non-uniform operation is due to Epsilon One's small susceptor which radiates in a non-uniform fashion with greater heat losses off the sides of the reactor to the edges necessitating lamp operation in a non-uniform fashion to compensate for that non-uniform heat loss. (XIX RT 1889:24-1890:23.) Mr. Peltzer testified that, in conducting his uniformity studies of the operation of Epsilon One, he did not measure the lamp flux at the wafer. (XX RT 2015:6-10.)

Mr. Johnston testified that because of large edge loss of the small susceptor in the Epsilon One reactor it is necessary to provide a compensating non-uniform field of energy, and that in Epsilon One temperature is controlled primarily by adjustment of lamp power and by use of a non-uniform field of radiant energy. (XXIV-A RT 2468A:2-25.) He further testified that Epsilon One does not

infringe the '496 patent because it does not have a substantially uniform field. (XXV RT 2694:3-10; XXIV RT 2450:10-14.) Mr. Johnston traced the evolution of the uniform field claim and concluded that although it was not in the original application it was added by amendment to distinguish the Mammel reference, and that the distinction so made was a material one in the Examiner's decision to issue the patent. (XXIV RT 2482:17-2484:10.) Since Epsilon One neither requires nor uses a uniform field it neither literally infringes nor does so under the doctrine of equivalents. *Id.* at 2484:13-23.

The position of the parties on this uniform field issue seems to me to be evenly balanced: On the one hand Plaintiff contends that the uniform field requirement contemplates multiple lamp banks and adjustment in the power of the lamps to compensate for non-uniform energy loss; on the other hand Defendants contend that the '496 claims an energy field which is uniform and does not extend to compensation for energy losses, that the reliance of Plaintiff on the AMC-740 as an aid to claim interpretation is improper, and that Plaintiff is stuck with its representation to the Patent Office that the lamps themselves produce the standard of uniform measurement rather than the measurement of the wafers.

I have carefully reviewed the evidence and must conclude that the probative force is substantially equally balanced, and that, consequently, Plaintiff has not sustained its burden of proof.

C.
SUSCEPTOR-THERMAL FLYWHEEL EFFECT
'496, '712 and '609 PATENTS

The contentions now considered concern whether the '496, '712 and '609 patents are infringed by the accused Epsilon One in that the latter employs a "susceptor of substantially greater size than the substrate and adapted to conduct and absorb radiant energy."

Claim 1 of the '609 patent provides, in part:

> 1. In a process for effecting chemical vapor deposition coating of a substrate in a reaction chamber, the steps of: placing the substrate in a reaction chamber on a susceptor of substantially greater size than the substrate and adapted to absorb and conduct radiant heat energy . . .

(Ex. 10).

Neither the '712 patent, (Ex. 1), nor the '496 patent, (Ex. 7), contain like language with respect to the size and conductivity of the susceptor means, but Dr. Oldham has testified that his testimony with respect to Claim 1 of the '609 patent is equally applicable to the '496 patent for the same stated reasons, (VI RT 642:5-9), and that the same is true with respect to the '712 patent, (id. at 643:19-644:3).

The testimony with respect to the '609 patent was that Element 1B of Claim 1 of the '609 patent refers to a susceptor of substantially greater size than the substrate, and that the Epsilon One device practices the method of Claim 1 of the '609 patent, (VI RT 595:21-596:11), in that

it has a susceptor of substantially greater size than the substrate as that language is used in Claim 1 of the '609 patent, and that the term "substantially greater size" means that it possesses "thermal flywheel effect" which Oldham defines as being sufficiently thick to have the ability to carry heat in a lateral direction from point to point, to store thermal energy, and to deliver thermal energy when needed, (id. at 598:4-599:8). Dr. Oldham stated that in this case "substantially greater size" refers to the thickness of the susceptor, (*id.* at 598:7-599:8), and that the size of the susceptor in the Epsilon One is sufficient to provide thermal flywheel effect to the supported wafer and to provide lateral thermal conductivity to even out temperature variations in the supported wafer. A susceptor eight to ten times thicker than the supported wafer and possessing thermal conductivities similar to the wafer provides a much greater lateral conductivity than the wafer alone. (id. at 604:13-605:8; Ex. 31.) Lateral thermal conductivity means the absorption of heat at one point of the susceptor and the delivery of it laterally to another point. (*Id.* at 601:20-602:17.)

Mr. Johnston agrees that thermal flywheel language used in the '609 and '712 patent prosecutions should be interpreted the same, (XXIV RT 2495:6-24), and he testified that the language of the '609 patent of "a susceptor of substantially greater size than the substrate" does not appear in the '496 patent, but it may be concluded that '496 and '712 have that limitation from the prosecution history of the '712 patent, requiring the retention by the susceptor of sufficient heat to maintain a substantially constant temperature during the reaction, which is the same thing as requiring a susceptor of substantially greater size than the substrate, (XXV RT 2629:6-20). All of the

elements of Claim 1 of the '609 patent are found in Claim 1 of the '496 patent and in Claim 1 of the '712 patent. (XXV RT 2631-2632:21.)

Plaintiff contends that Epsilon One's susceptor clearly employs a "susceptor of substantially greater size than the substrate and adapted to conduct and absorb radiant energy."

Defendants' first position is that Epsilon One's susceptor is not of substantially greater size than the substrate. Reliance is placed on the patent drawings of the '609 patent, (Ex. 10), of which Figures 1 and 2 show a cross section of the susceptor holding 40 wafers, (Oldham testimony, VI RT 675:21-676:14). From those figures Dr. Oldham agreed that if the area of the susceptor there depicted be compared relative to the size of one of the depicted wafers the susceptor area would be eighty to one hundred times larger than the area of a single wafer. (VI RT 677:3-16.) Defendants argue that by the use of the specifications to interpret the claims I should conclude that "substantially greater than the size of the substrate" means 80-100 times larger.

Mr. Johnston, when asked in deposition whether he knew how much greater the thermal mass of the susceptor has to be relative to the thermal mass of the wafer in order to perform the thermal flywheel effect, replied it had to be simply enough to provide satisfactory operation, to get a good deposition of the material on the substrate. (Johnston testimony, XXV RT 2674:4-16.) He further testified that in terms of the wafer deposition which it achieves the Epsilon One gets good results with its susceptor, and that Epsilon One gets thermal flywheel effect in terms of

uniform wafer temperature if its lamps operate properly. (XXV RT 2675:7-22.)

To the extent that the Mammel reference is pertinent to the '496 and '712 patents, any distinction based upon a predicate that the Mammel susceptor is larger than the susceptor of Epsilon One, which distinction was presented by Mr. Johnston, appears to me to be without substance. (*Id.* at 2692:4-2693:23.) Although Mr. Peltzer testified that the Epsilon One susceptor is too small to infringe on the basis of susceptor size because it is approximately the same size as the wafer, he admitted that his words "approximately the same size" refer only to lateral extent of the susceptor and that, in fact, in terms of overall size the Epsilon One susceptor is twelve times the overall size of six-inch wafers and six-inch susceptors and eight-inch wafers and eight-inch susceptors and to the extent a six-inch susceptor is used to hold three, four and five inch wafers, much more. (XXII RT 2302:2-2303:2.) Mr. Peltzer relied apparently primarily on lateral extent in his evaluation of size of thermal mass. (XIII RT 1315:2-7.)

Mr. Peltzer states that all susceptors have some thermal flywheel effect, but states that the limitation is not infringed unless "in the face of disturbing influences the susceptor maintains the temperature." (XIII RT 1316:4-11.)

Dr. Oldham testified that the desired property of the susceptor is to even the temperature distribution across the wafer, and in order to do that the susceptor must be of greater size than the substrate, and the word "size" primarily refers to thickness. (VI RT 598:4-599:8.) It is the thermal mass which is the enabling part of the thermal flywheel effect. (*Id.* at 599:9-24.) Dr. Oldham testified that

the thermal mass of the susceptor of Epsilon One is 9.3 times the thermal mass of a six-inch wafer supported by it. (*Id.* at 601:16-18.)

Dr. Oldham opined that the Epsilon One susceptor is of a sufficient size to provide a thermal flywheel effect to a wafer supported by it and has sufficient lateral thermal conductivity to maintain uniform wafer temperature during reaction. (*Id.* at 604:13-605:8.)

Dr. Oldham, relying upon Exhibit 219, an in-house Defendant memorandum dated as revised May 8, 1987, opined that Epsilon One maintained a substantially uniform wafer temperature and that wafers were reported as slip free which is significant because it indicates uniformity during heat up and cool down as well as during the deposition process. (*Id.* at 608:14-609:12.)

I think that the main difference of opinion between the experts is this: Defense opines that to be within the claim limitation the susceptor must be sufficiently large to hold and transmit sufficient heat to establish the requisite uniform temperature during reaction; the testimony indicates that Epsilon One does not infringe in this regard because its mass is too small to accomplish that result without its complex ten zone heating and ability to rapidly heat and cool; Plaintiff's expert testimony persuasively sets forth a somewhat apparent conclusion that the mass of the Epsilon One susceptor is sufficient to establish thermal flywheel effect and lateral conductivity and that the wafer results are excellent.

The contention that the Epsilon One susceptor only functions properly when its small mass is properly

supported by lamps is not significant of itself, because all reactors, it seems to me, must necessarily depend upon properly directed heat source.

I conclude that the element of Claim 1 and dependent Claim 3 of the '609 patent providing "placing the substrate in the reaction chamber on a susceptor of substantially greater size than the substrate and adapted to absorb and conduct radiant heat energy," Claim 1C of the '496 patent and Claim 1C of the '712 patent are each literally infringed by the accused Epsilon One.

D.
COOL WALL REACTOR WITH NO FILM DEPOSITS '496 AND '712 PATENTS

The Plaintiff's brief states that Defendants have abandoned their contention that Epsilon One is a cool wall reactor. Defendants' brief states that it is irrelevant to consider whether Epsilon One is a cool wall reactor because the issue is whether Epsilon One meets the claim requirements of "walls substantially free" of film deposits.

I am satisfied by a preponderance of the evidence that Epsilon One does meet the limitations of Claims 1(b)(1) of the '496 and '712 patents.

Dr. Plummer said that Epsilon One's deposits are "insubstantial", (Ex. 268 at S 1825); such deposits as exist on Epsilon One do not prevent the processing of high quality wafers. Mr. Peltzer felt that the operation of Epsilon One operating in a condition of growth on the wall and an Applied Materials reactor operating without growth on the wall produces an equivalent product. (XX RT

2052:1-12.) Mr. Johnston was of the view that whatever film deposits are experienced during Epsilon One's operation do not prevent commercially acceptable deposition. (XXV RT 2652:4-12.)

The experts agree that a reactor is "substantially free of film deposits" when the deposits do not deter successful deposition on the wafer. (Oldham testimony, VI RT 641:5-17; Peltzer testimony, XX RT 2028:9-2029:21; Johnston testimony, XXV RT 2640:21-2652:9.)

I find that Claim 1(b)(1) of the '712 patent and 1(b)(1) of the '496 patent are literally infringed.

I make this finding assuming that the "whereby" clause does constitute a limitation.

E.
THE LOGAR '389 PATENT

The '389 patent, (Ex. 9), claims invention of a particulate free epitaxial process. In Claim 1 it claims the use of heat lamp power to be used during pre-processing purge steps to kill static which carries particles to the wafer to be processed.

Claim 1 of the '389 patent is said by Plaintiff to consist of three limitation elements: The first of these is a hydrogen or nitrogen purge accomplished before the CVD of the wafer; the second, radiant lamps for heating the reactor chamber for purposes of epitaxial deposition; third, use of radiant lamps during pre-processing purge at a power level below the level used for gas processing.

Plaintiff argues that the first of these limitations, the pre-deposition purge step is present in Epsilon One. Plaintiff characterizes the dispute between the parties as whether Epsilon One's pre-deposition purge is a "cold purge" within the meaning of the '389 patent. Mr. Logar, the inventor of the '389 invention, testified that the application of heat in the range between six to ten percent of lamp power at the lower end, and 850 degrees C at the upper end, was successful in eliminating the static attraction of particles. (VIII RT 788:11-789:3.) Mr. Logar is not sure that elevated heat, such as 850 degrees C, reduced the number of particles attracted, or whether such a reduction was due to other factors. (*Id.* at 792:7-793:5.) He testified that pre-processing cold purge temperature within the contemplation of his patent could be above 180 degrees C but below the processing temperature. (*Id.* at 798:17-20.) Mr. Logar testified that if the reaction chamber were purged at a temperature of 850 degrees C, he would not consider that to be a cold purge, (*Id.* at 824:17-19), and he does not contemplate his invention as applying to a process not involving a cold reactor. (*Id.* at 824: 20-22.)

Plaintiff defines the second element of limitation as being the use of radiant lamp heating means to effect epitaxial deposition, which occurs in Epsilon One. (Ex. 130.)

The third element of limitation according to Plaintiff covers the use of radiant lamps during the pre-processing purge "at a power level below that used for said gas phase processing." Plaintiff states in its post-trial brief, "This is the claim element that defines the environment in the chamber during the 'cold purge' step." Plaintiff contends

that the language "to supply energy at a relatively low flux density" does not mean the 6-10% of lamp power listed in the '389 patent specification, (Ex. 9, Col. 9:28-36), but instead means that the lamp power used during the purge step must be lower than the lamp power used during deposition. (Plaintiff's Post-Trial Brief at 72:1-9.)

Plaintiff cites transcript references to the testimony of Messrs. Peltzer, Carney and Logar which are not inconsistent with its contention.

Plaintiff's conclusion is:

1. Mr. Ferro testified that Epsilon One's power level of lamps during pre-processing purge step is about 44% of deposition lamp power. (V RT 563:25-564:2.)

2. That level of lamp power during the pre-processing purge falls squarely within the limitation of Claim 1 of the '389 patent:

> During said gas flow step operating the radiant energy lamp means at a power level below that used for said gas phase processing heating to supply radiant energy at a relatively low flux intensity to substantially eliminate static-induced particle transport to the wafer.

Plaintiff's ultimate contention is that Epsilon One literally infringes Claim 1 of the '389 patent.

Defendants' overall position on the Logar patent is that it addresses a problem which is not present in the Epsilon One device, that of particle contamination when a purge occurs by the flow of gas over wafers within a

reactor chamber the temperature of which is less than 180 degrees C. Since Epsilon One's temperature during all of its operation exceeds 180 degrees C, Defendants contend that the '389 invention simply does not apply to Epsilon One. (Carney testimony, XIV RT 1453:7-1454:14; Peltzer testimony, XIII RT 1372:6-15; Logar testimony, VIII RT 830:16-831:6.)

Defendants contend that there can be no literal infringement of the '389 patent because Claim 1 requires a "cold purge process" achieved by operating the lamp means at a power level below that used for gas phase processing to supply radiant energy at a relatively low level flux intensity, 6-10% of lamp power, to eliminate substantially static-induced particle transport to the wafer. Defendants say that the upper limit of temperature prescribed by the patent for the cold purge process is 180 degrees C because the particle count stabilizes and there is no attraction resulting in the transport of particles to the wafer above 180 degrees C. (Carney testimony, XV RT 1502:9-1503:20; Logar testimony, VIII RT 823:10-824:19.) The utilization of heat above 180 degrees C is thus not regarded by Defendants as being part of the cold purge process and that I should so interpret Claim 1. If this is the correct interpretation, Epsilon One cannot literally infringe because it never operates as a reactor at a temperature below 180 degrees C and therefore never has a "cold purge" within the meaning of the '389 patent. (Carney testimony, XV RT 1503:21-1504:6; Oldham testimony, VII RT 748:24-749:2.) Defendants urge that Dr. Oldham's interpretation of "cold purge" to cover any purge taking place at a temperature below deposition temperature or high temperature etch level of heat, (VI RT 655:13-19), is not supportable because it is not found among definitions

in either the patent specification or the file history. Plaintiff takes exception to that contention, citing references which are contended to be in contradiction[1].

The '389 specification, (Ex. 9, Col. 9:20-25), defines electrostatic attraction as being greatest at temperature less than 180 degrees C and as being substantially non-existent above that temperature. Electronic attraction existing below 180 degrees C can be immediately eliminated by use of low level radiant lamp power. (*Id.* at Col. 9:27-33.) Thus it appears to me that the specification defines the cold purge area as being below 180 degrees C. Dr. Oldham's definition of cold purge was not found by me in the specification. Mr. Peltzer testified that the term "cold purge" as used in the industry is a process at a temperature less than 180 degrees C. It is a process usually done at room temperature. (XIII RT 1355:1-7; 1358:16-1359:25; Ex. 909.)

The preamble language in Claim 1, "in a cold purge process", (Ex. 9, Col. 11:58), was added by supplemental amendment, (Ex. 12, p. 103). Defendants contend that the preamble term "cold purge" refers to the prior art step in the reaction process during which the '389 invention was intended to be applied, and as such is deemed a requirement of the '389 invention, and to establish a

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[1] Ex. 9 at Col. 9:18-19; Table 1, Steps 1 and 2 of the '389 patent; Claim 10 of the patent, providing, says Plaintiff, that the temperature should be "between 180 degrees C and below the epitaxial deposition temperature", (Ex. 9 at Col. 12:15-61); Logar testimony that "cold purge" means cold relative to the gas phase processing temperatures, (VIII RT 798:1-6).

limitation which the accused device must meet in order to literally infringe the '389 patent. *Wells Mfg. Corp. v. Littelfuse, Inc.*, 547 F.2d 346 [192 U.S.P.Q. 256] (7th Cir. 1976). The cold purge problem, thought of in the light of particle transport, is an old problem to which the '389 invention is to be applied, and which is the sole motivating reason for the '389 invention. I think that it is necessary to state with what the invention "coacts" and how the function of the invention affects the cold purge portion of the reaction process which is old. Therefore, I think that the preamble in Claim 1 of '389 is an actual limitation.

There is no evidence that Epsilon One is ever operated as a reactor at a temperature of less than 180 degrees C. Logar was asked in deposition whether electrostatic attraction would be possible if purge steps were carried out at ambient temperature with no lamps on, and he answered that the potential would exist, but also characterized that answer as speculative. (VIII RT 810:2-9.)

Aside from this, the record contains no evidence of present or contemplated use of Epsilon One at temperatures lower than 180° C.

The preponderance of the evidence does not favor a finding of literal infringement and I find that Claim 1 of the '389 patent is not literally infringed.

F.
'389 PATENT DOCTRINE OF EQUIVALENTS

Claims 1 and 4 are alleged by Plaintiff to be infringed under the doctrine of equivalents. *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931 (Fed. Cir. 1987), holds

> Under the doctrine of equivalents, infringement may be found (but not necessarily) if an accused device performs substantially the same overall function or work, in substantially the same way, to obtain substantially the same overall result as the claimed invention.

With respect to Claim 1, Plaintiff contends:

> Epsilon One performs the same function (static kill during the purge step) in the same way (use of lamps to kill static) to achieve the same result (epitaxially coated wafers without static-induced particulate contamination).

Post-Trial Brief 120:21-24.

Plaintiff's analysis is based upon Mr. Carney's testimony in XVI RT 1645-1648. Mr. Carney stated that the requirement of the doctrine of equivalents for a process claim is the same work being performed in substantially the same way to achieve substantially the same result. (*Id.* at 1645:6-10.) The first work performed by the terms of Claim 1 is the communicating a flow of conditioning gas into the reaction chamber, which is work that occurs in Epsilon One. (*Id.* at 1646:17-1647:7.) The second work

performed under Claim 1 is the operation of the radiant energy lamp means at a power level below that used for gas phase heating to supply radiant energy at a relatively low flux intensity. The work of operating radiant energy lamps during the gas flow step is performed by Epsilon One. (*Id.* at 1647:16-1648:1.)

As I understand Mr. Carney's testimony, the way that Epsilon One performs differs from the way in which the '389 invention performs lies in Mr. Carney's view that the wafer subjected to reaction in the '389 invention and that subjected to reaction in the Epsilon One differ in their condition at the time of exposure to the gas flow (first work) and to the heat from the radiant lamp means (second work). (XVI RT 1650:7-20.) I think that the difference perceived by Mr. Carney is that the '386 invention wafer, such as might be found in the Plaintiff's reactor, at the time of the two concurrently applied "works" is subject to static-induced particle transport, while the wafer utilized by Epsilon One, because of the prevailing heat in the chamber at the time of the wafer's entrance, is not subject to such particle transport. (*Id.* at 1650:18-1651:15.) Defense counsel put it a different way in their Corrected Post-Trial Brief:

> The Epsilon One does not infringe Claim 1 under the doctrine of equivalents because it does not perform substantially the same function in substantially the same way as the claimed invention. (citation omitted) The Epsilon One has no cold purge. Without cold purging the Epsilon One cannot perform the claimed function of "eliminating static-induced

> particle transport." It cannot eliminate electrostatic particle attraction that does not exist. As Carney testified, it is like trying to snuff out an unlit candle.

Brief at p. 40:21-27.

Defendants contrast the "cold purge" of the Logar patent with what it denominates the "hot purge" of Epsilon One, i.e., greater than 900 degrees C. Defendants contend that the contrasting temperatures clearly show different "ways" of achieving particulate-free wafers. Defendants rely on Mr. Carney's testimony to the effect that Claim 1 of the '389 patent states, as a part of the claim "to substantially eliminate static-induced particle transport to the wafer." (Ex. 9, Col. 12: 1 & 2.) The work of Epsilon One never complies with that claim limitation, because there is no static-induced particle transport to the wafer, and therefore Epsilon One does not perform its work in the same way. Defendants also rely upon a statement in Plaintiff's Continuation In Part Application to the effect that the term "cold purge" does not cover a purge above 750 degrees C. Mr. Carney opined that cold means 180 degrees C or below and that temperatures over 750 degrees C are hot. (XV RT 1489:22-25; Ex. 222A, pp. 25-27.)

I have considered and weighed this evidence and I think that Claim 1 of the '389 patent is infringed under the doctrine of equivalents.

Mr. Carney's analysis of the performed work shows that Epsilon One performs the patent specified work. It does it by the application of heat, admittedly at higher levels than Mr. Logar advocates, but arguably within the literal terms of the patent. (Ex. 9, Claim 1.)

Epsilon One and the '386 invention achieve the same result, static-induced particle-free wafers, and they do it in the same way, by the application of heat. Whether you call it hot purge or cold purge, the methodology and the result are the same.

Claim 1 of the '389 patent is infringed by Epsilon One.

With respect to Claim 4, Mr. Carney also identified the "work elements" of the claim as (1) "flowing a purging gas through the chamber" and (2) "heating the wafer to a temperature between 180 degrees C and below said gas phase processing." (XVI RT 1651:21-1652:15.) Mr. Carney stated that the "work" element consisting of the flow of at least one purging gas through the chamber occurs in Epsilon One, (*id.* at 1652:4-8.), but that the "work" of heating the wafer to a temperature between about 180 degrees C and below gas phase processing temperature does not occur in Epsilon One. (*Id.* at 1652:16-17.) Mr. Carney states the reasons for this opinion in id. 1652-1657:15. Apparently Mr. Carney's position is based upon his undocumented belief that the room temperature wafer enters the Epsilon One reactor, but that hydrogen gas flow does not commence until the wafer is ensconced on the susceptor, and that at that time the wafer has already achieved a temperature in excess of 180 degrees C, and that therefore the function of decreasing electrostatic attraction caused by gas flow over a wafer in a "cold" chamber does not exist, inasmuch as the wafer temperature was highly elevated before the gas flow commenced, and that the electrostatic attraction never existed at all.

The function is to eliminate static. The "way" of controlling particle transport is through application of heat and radiant lamp power. It seems clear to me that the "way" the Epsilon One does this by maintenance of heat over 180 degrees C and the '386 invention does it by temperature elevation during the purge are functionally the same and that Claim 4 of the '389 patent is infringed under the doctrine of equivalents.

Defendants contend that Plaintiff's interpretation of Claim 1 to cover a purge at a temperature higher than 180 degrees C causes Claim 1 to read on U.S. Patent No. 4,430,149 to Berkman, (Ex. 565), and to thus "improperly encompass the prior art." Defendants claim that the interpretation in question would render the claim invalid, as containing the elements of the invention patented under U.S. Patent No. 4,430,149 to Berkman, (Ex. 565), and under Table 1 of the Logar patent, which contains steps known to the prior art as a standard process sequence. The Berkman '149 patent is in evidence as Exhibit 565 and is entitled "Chemical Vapor Deposition of Epitaxial Silicon." Defendants contend it discloses a continuous reactor in which wafers are loaded at 200 degrees C or above and purged with gasses before entering the deposition area. Berkman is said to heat the wafers to 300 degrees C before putting them into the deposition chamber where the temperature is maintained at 940 degrees C. Berkman has no problem with electrostatic particle attraction. (Defendants' Corrected Post-Trial Brief 38:3-11.) Defendants therefore argue that if the "cold purge" limitation set forth in the preamble is held to include temperatures above 180 degrees C then the process contemplated by the '389 patent

is the same as in Step 3 of Table 1 of the '389 patent, heat to 850 degrees C, and reads on the Berkman '149 patent.

Plaintiff, relying upon the testimony of Mr. Peltzer, Defendants' expert witness, (XXII RT 2191:23-2192:19), argues that there is no purge step in the Berkman reactor once the reactor commences the deposition process, and that this lack distinguishes Berkman from the '389 patent and from Epsilon One, both of which require a purge step with a wafer in the chamber, and that therefore Berkman is not "ensnared" if "cold purge" is interpreted to cover heat applications of more than 180 degrees C. In Berkman the heat is never less than 200 degrees C, (Ex. 565, Fig. 3A), and in Berkman the substrates are heated while being kept separated from the source gas in the first zone of the chamber. (Col. 2:60-62.) In other words, the purge in Berkman does not take place in the reaction chamber, but adjacent to it. Mr. Carney testified that the end isolation zone where the gasses are said to merge is separated from the reaction chamber. (XVI RT 1642:25-1643:17.)

With respect to the effect of Step 3 of Table 1 of the '389 patent, Plaintiff persuasively argues that the reference (which is simply to temperature elevation) does not show a combination of pre-processing purge with heat in the deposition chamber and therefore does not bear on either the validity of the '389 patent or upon Epsilon One. Defendants take exception to the argument that Berkman is not applicable prior art and is not "ensnared" by Plaintiff's interpretation of the "cold purge" term of the '389 patent because of a statement in the Specification of the '149 patent at Col. 7:19-22:

> Moreover, it should be understood the principle of the invention is applicable to conventional CVD batch reactors in which the substrates or wafers are stationary.

It is Defendants' view that in view of the inventor's express intent the steps occurring in a continuous reactor such as Berkman and the steps occurring in a stationary reactor such as '389 and Epsilon One, are the same.

I find in favor of the contention that the prior art is not ensnared, because it is not clear to me from the evidence that either Peltzer or Carney ever opined that the '389 patent is obvious over Berkman. Peltzer says at XXII RT 2189:23-2190:1 that if the interpretation of '389 is "extended" it eventually comes "into contact" with Berkman. I am not convinced from the cited testimony and patent reference in Defendants' Post-Trial Reply Brief that either Berkman or Step 3 of Table 1 imposes a sharply confined scope upon the '389 invention. While the "principle of the ('149) invention" may be applicable to both continuous and batch reactors, nothing in the evidence shows how and in what manner that principle may be applied.

CONCLUSION

1. The '712 patent is enforceable and infringed.

2. The '496 patent is enforceable and infringed only with respect to Claim 1C.

3. The '313 patent is invalid for failure to disclose the best mode for practicing the invention.

4. The '609 patent is valid, enforceable and infringed.

5. The '389 patent is infringed under the doctrine of equivalents.

DATED: April 26, 1994

/s/ William A. Ingram
WILLIAM A. INGRAM
United States District Judge

APPENDIX D

UNITED DISTRICT COURT FOR THE
NORTHERN DISTRICT OF CALIFORNIA

Civil Action No. C-91-20061 RMW

APPLIED MATERIALS, INC.,
Plaintiff/Counterdefendant,
v.
ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC. and EPSILON TECHNOLOGY, INC., d/b/a ASM EPITAXY, ADVANCED SEMICONDUCTOR MATERIALS INT'L N.V.,
Defendants/Counterclaimants.

August 10, 1994

AMENDED PERMANENT INJUNCTION

Plaintiff Applied Materials, Inc.'s ("Applied Materials") permanent injunction motion came on regularly for hearing. The court, having considered the papers before it and hearing the arguments of counsel, finds that there is good cause for issuing the injunction.

By ruling of April 26, 1994, this court has found that Defendants' Epsilon One reactor infringes United States Patent Nos. 4,496,602 [sic] (the '602 [sic] patent), and 4,728,389 (the '389 patent), which remain in force until January 29, 2002 and March 1, 2005, respectively.

Pursuant to the authority of 35 U.S.C. §§ 283, 271(a), 271(b) and 271(c), the court finds that there is use of the said Epsilon One reactor in the United States with the processes found infringing by this court which

constitutes a direct infringement. The court makes a post-trial finding of active inducement of infringement or of contributory infringement under 35 U.S.C. § 271(b) and (c) noting the stipulation set forth in Exhibit C to the Declaration of Reines filed May 13, 1992. It is just and equitable to issue the injunction hereinafter set forth.

IT IS HEREBY ORDERED, ADJUDGED AND DECREED that Defendants, Advanced Semiconductor Materials America, Inc. and Epsilon Technology, Inc., and each of them, their officers, agents, servants, employees and attorneys and those acting in concert or participating with them who have adequate notice of the Order are enjoined and restrained from performing any of the following acts:

1. Selling, delivering or otherwise transferring an Epsilon One reactor or any other reactor that has no substantial use other than practicing the processes which this court has found to infringe Claims 1, 2, 3 or 4 of the '609 patent or Claims 1, 2 or 4 of the '389 patent in the United States.

2. Use of the Epsilon One reactor or any other reactor to practice processes infringing Claims 1, 2, 3, or 4 of the '609 patent, or processes infringing Claims 1, 2 or 4 of the '389 patent in the United States.

IT IS FURTHER ORDERED that the above injunction shall remain in full force and effect as to each claim of each patent until on the following events occurs: (1) the patent claims expire, which occurs on January 29, 2002, for the '609 patent, and March 1, 2005, for the '389 patent; or (2) the patent claim is found invalid or unenforceable by a final decision of a court of competent jurisdiction; or (3) the patent claim is disclaimed or canceled by the owner of the patent or the Patent Office under 35 U.S.C. §§ 235 or 307; or (4) until otherwise ordered by this court.

DATED: August 10, 1994

/s/ William A. Ingram
WILLIAM A. INGRAM
United States District Judge